

# 기후변화시대에 코로나 팬데믹

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# 목 차

I. 왜 위기인가 ?

II. 위기의 성격은 ?

III. 어떻게 이겨낼 수 있나 ?

# 목 차

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# 코로나 팬데믹: 불확실성의 시기에 확실한 두가지!

- 2차 대유행이 (곧) 올 것!

-올해안으로는 효과적이고 안전한  
백신/치료제가 없음 !!

→ 올해는 방역 대비/대응으로 버텨내야 함 !!

# 공중보건위기와 코로나19

- **공중보건위기(public health crisis):** 한 (지역)사회 내 건강문제가 통상의 보건의료체계와 자원으로서는 관리할 수 있는 수준을 넘어서는 상황 → 공중보건위기 대비/대응의 전제 !!

(Nelson et al, 2007, AJPH)

**: 재난의 규모, 시간, 그리고 예측 가능성으로 평가**

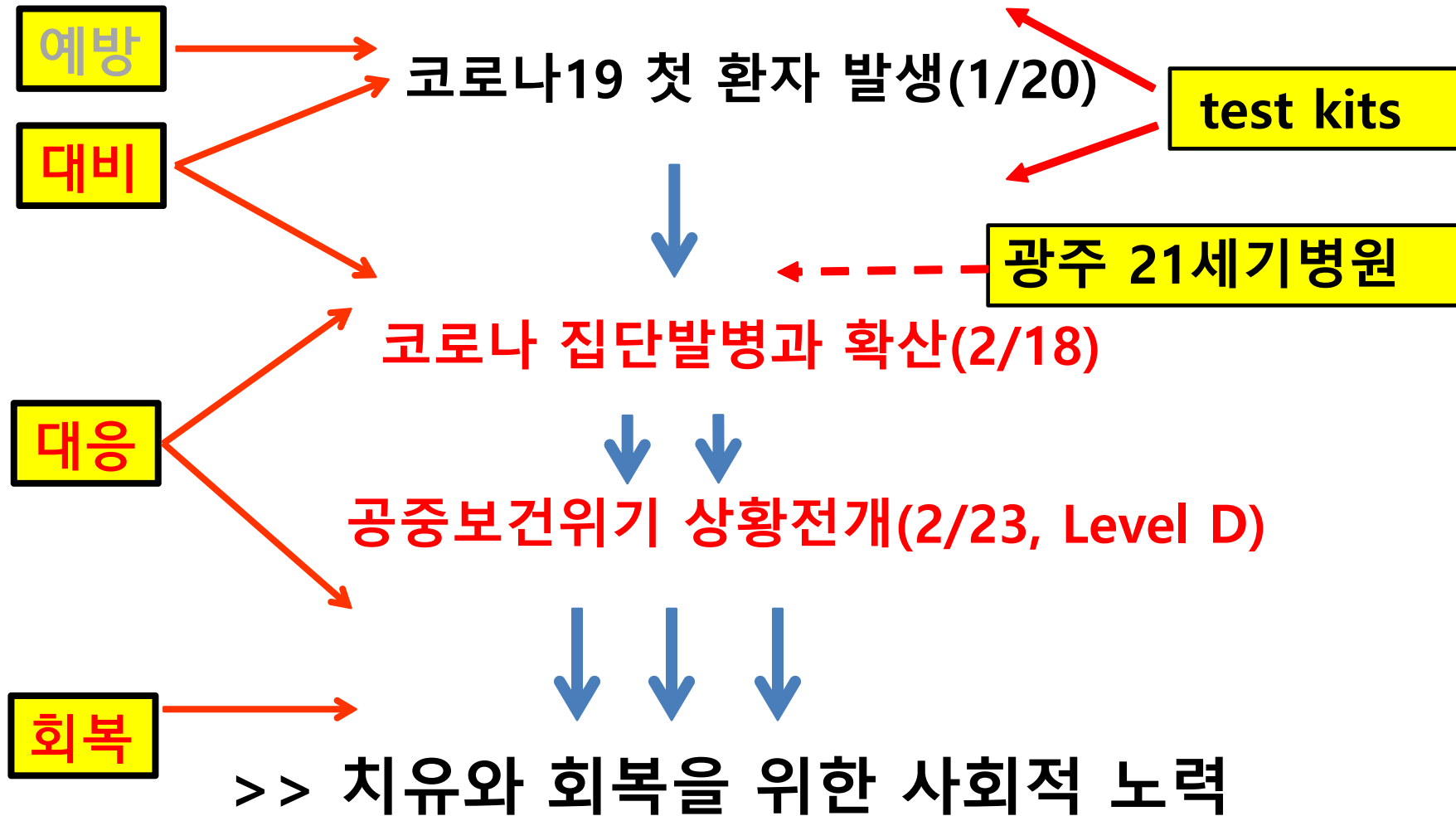
- 공중보건위기 상황으로서 코로나-19 ?

- 시간: 단기간에( 5~6 month)
- 규모: 환자 9,051 k (**12,438 명 in SK**) / 사망 470 K (**280명 in SK**), as of 6/22/2020

(<https://www.worldometers.info/coronavirus/> , <http://ncov.mohw.go.kr/en/>)

- 비예측성: 사회 구성원 모두가 실재적, 잠재적 공포를 경험하고, 정상적 사회활동이 극도로 위축

# 공중보건위기로서의 코로나19

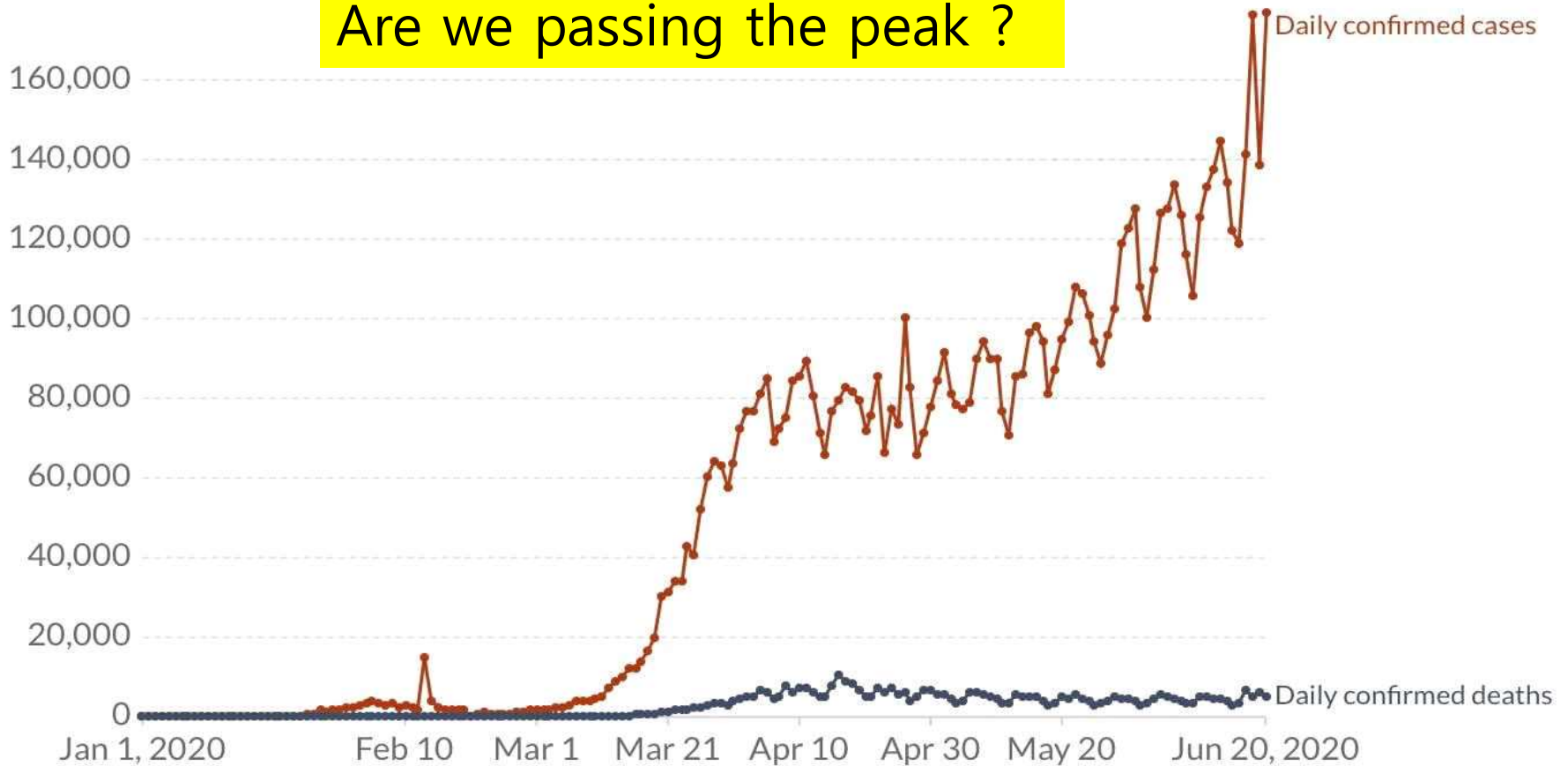


## Daily confirmed COVID-19 cases and deaths, World

The confirmed counts shown here are lower than the total counts. The main reason for this is limited testing and challenges in the attribution of the cause of death.

LINEAR LOG

Are we passing the peak ?



Source: European CDC - Situation Update Worldwide - Last updated 20th June, 11:00 (London time)

CC BY



Dec 31, 2019



Jun 20, 2020

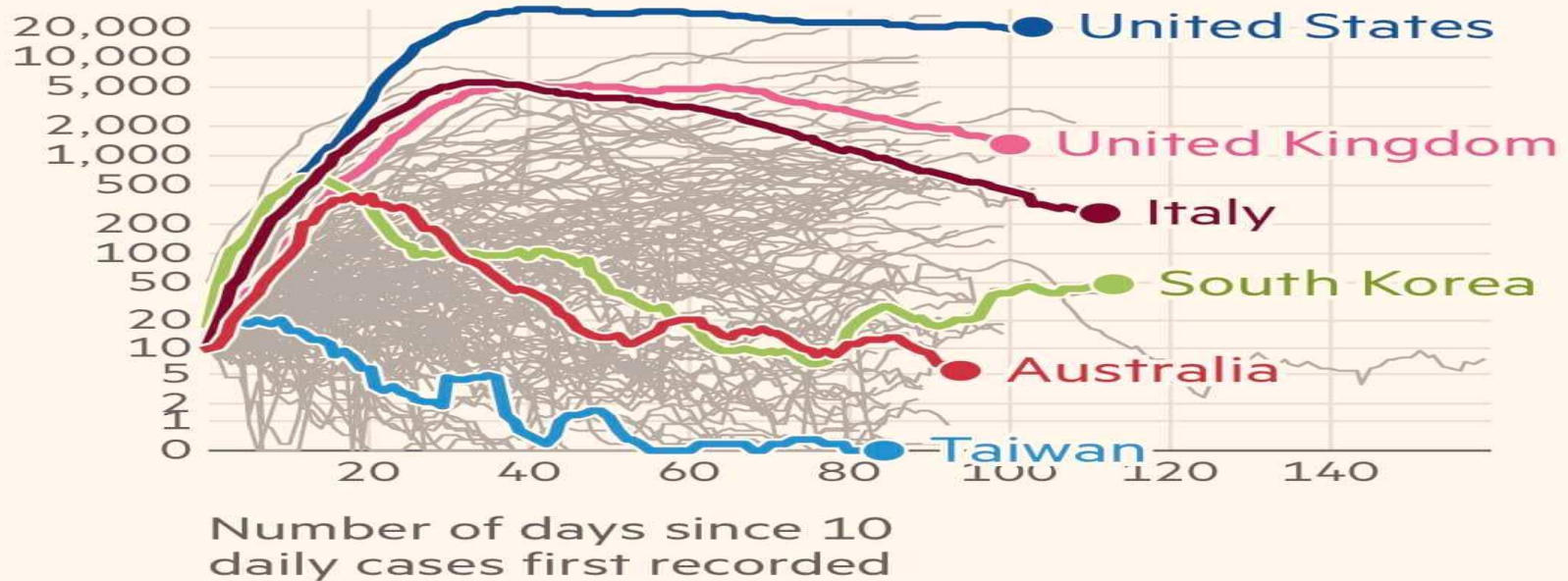
Deaths

Cases

Options

## New confirmed cases of Covid-19 in United States, United Kingdom, South Korea, Taiwan, Italy and Australia

Seven-day rolling average of new cases, by number of days since 10 average cases first recorded

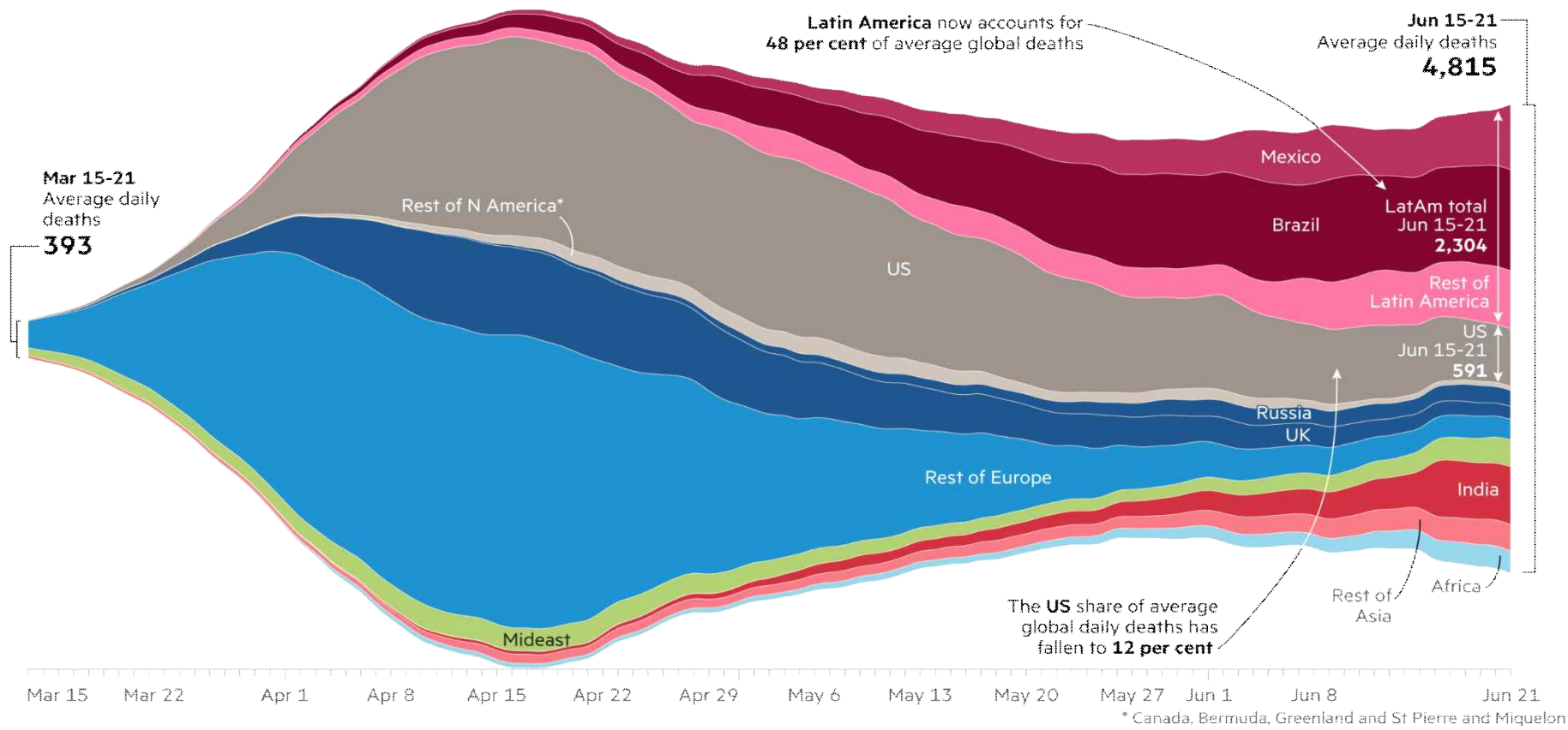


Source: FT analysis of data from the European Centre for Disease Prevention and Control and the Covid Tracking Project. Data updated June 13 2020 2.51pm BST

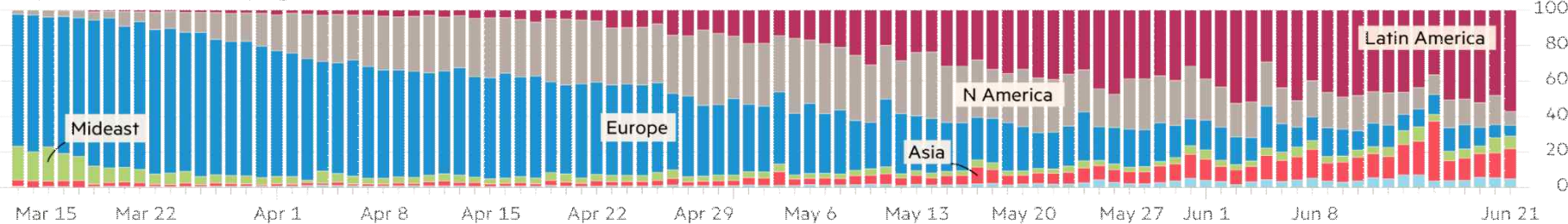


# Global Covid-19 death toll: Latin America offsets decline in Europe and the US

Daily deaths of patients diagnosed with coronavirus (7-day rolling average)



Daily confirmed deaths (% by region)

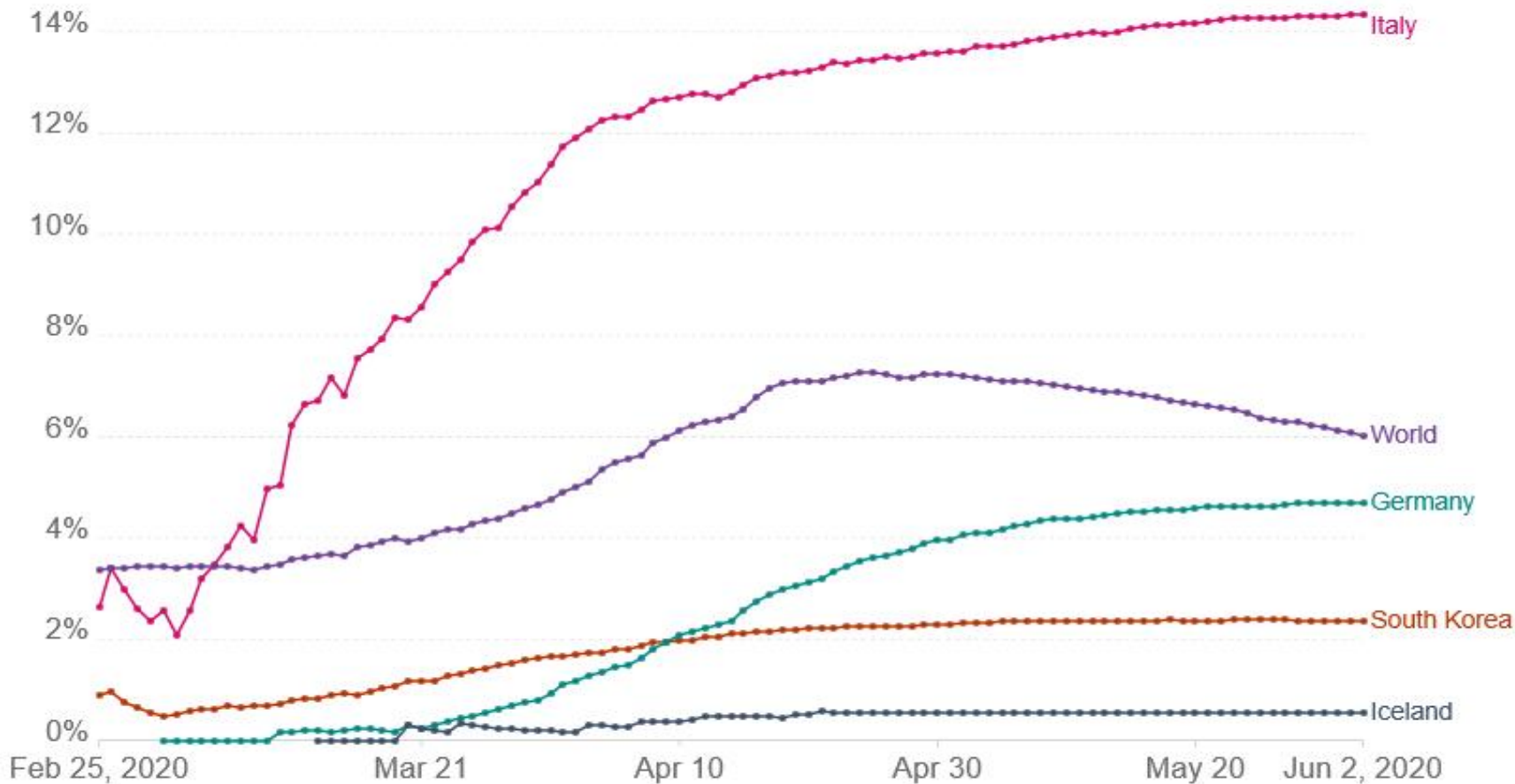


## Case fatality rate of the ongoing COVID-19 pandemic

Our World  
in Data

The Case Fatality Rate (CFR) is the ratio between confirmed deaths and confirmed cases.

During an outbreak of a pandemic the CFR is a poor measure of the mortality risk of the disease. We explain this in detail at [OurWorldInData.org/Coronavirus](https://OurWorldInData.org/Coronavirus)



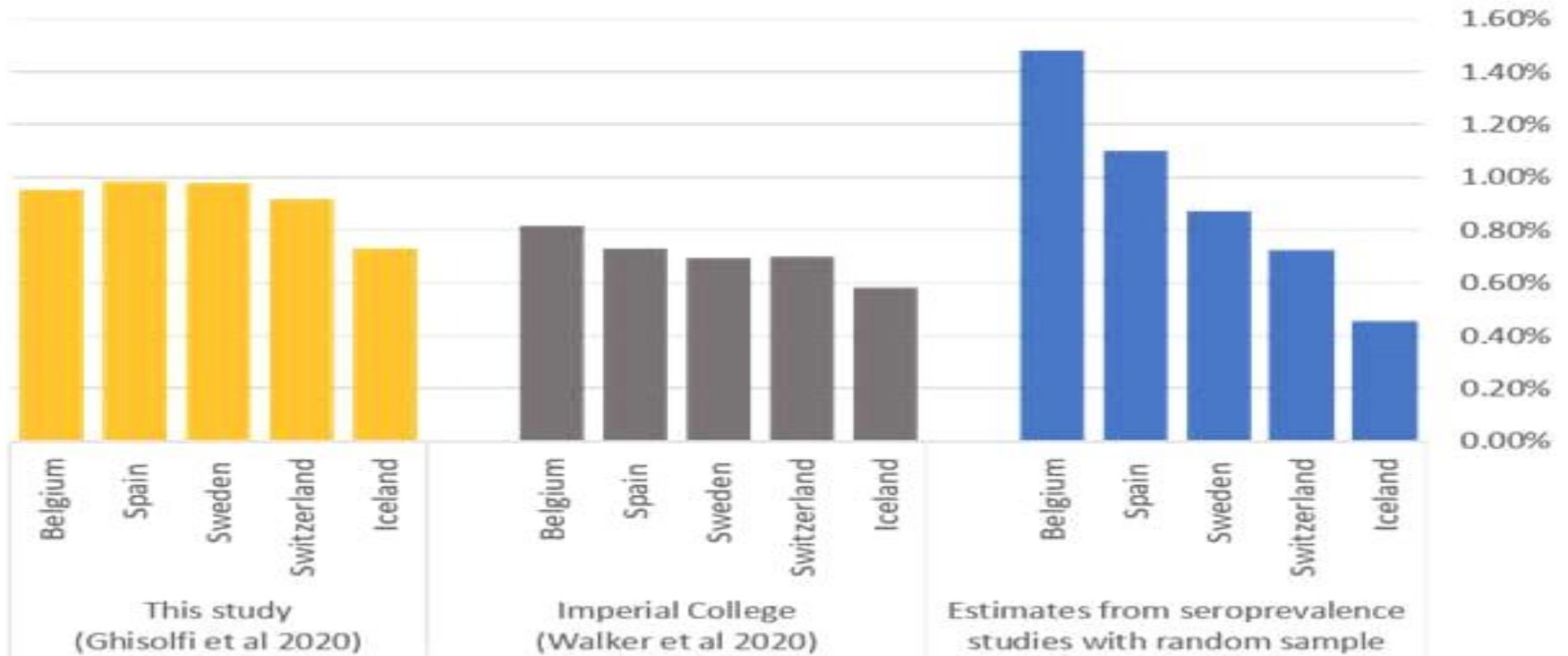
Source: European CDC – Situation Update Worldwide – Last updated 2nd June, 11:45 (London time)

Note: Only countries with more than 100 confirmed cases are included.

[OurWorldInData.org/coronavirus](https://OurWorldInData.org/coronavirus) • CC BY

# Predicting COVID-19 Infection Fatality Rates

Selected European Countries



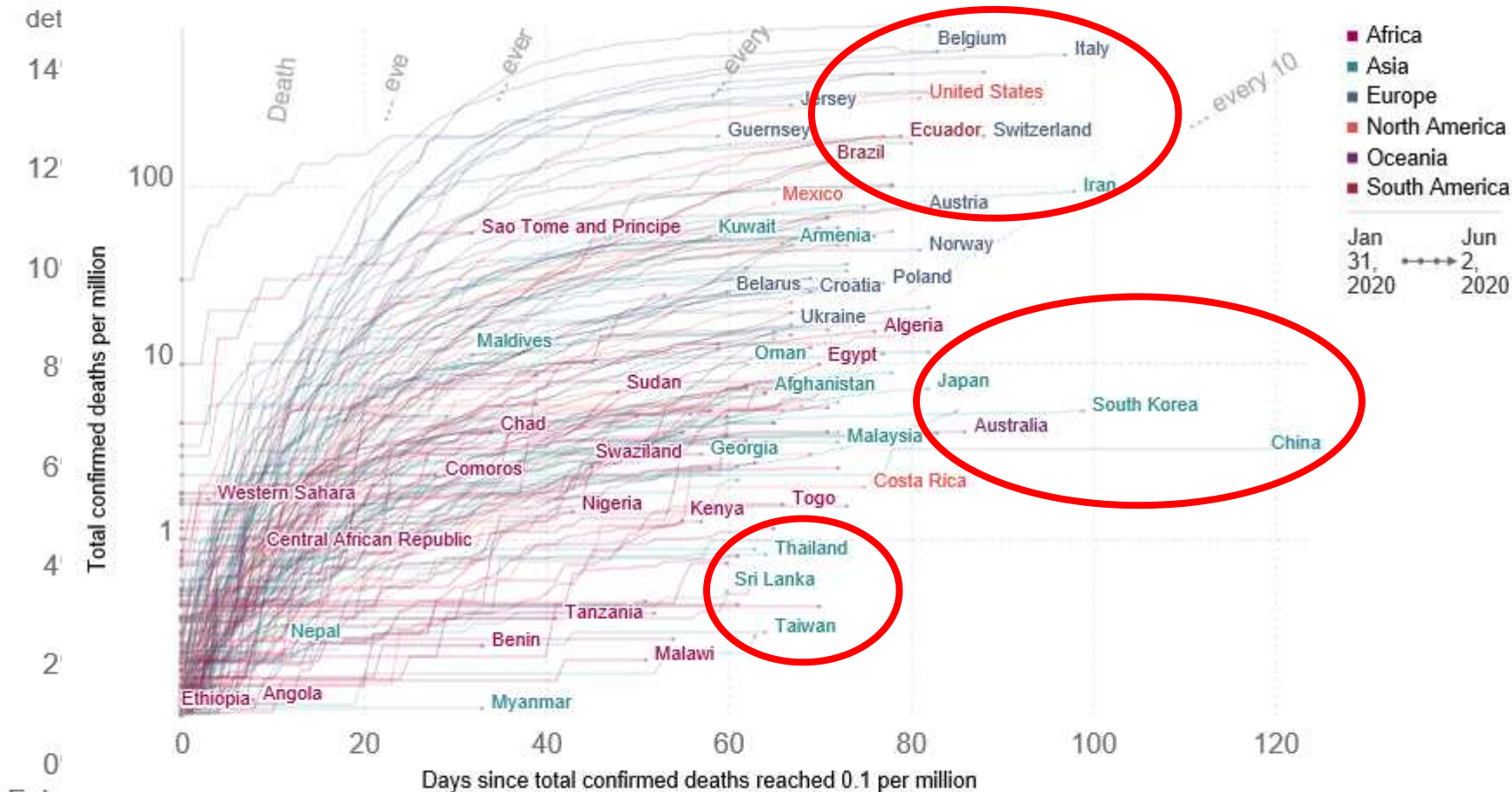
# 국가별 인구 백만명당 코로나19 사망률 추이, 6/2/2020

## Total confirmed COVID-19 deaths per million: how rapidly are they increasing?

Our World in Data

C:  
The  
Du  
det

Shown are the total confirmed deaths per million people. Limited testing and challenges in the attribution of the cause of death means that the number of confirmed deaths may not be an accurate count of the true number of deaths from COVID-19.



Source: European CDC – Situation Update Worldwide – Last updated 2nd June, 11:45 (London time) OurWorldInData.org/coronavirus • CC BY

Note: Only countries with more than 100 confirmed cases are included.

# Why big differences among countries ?

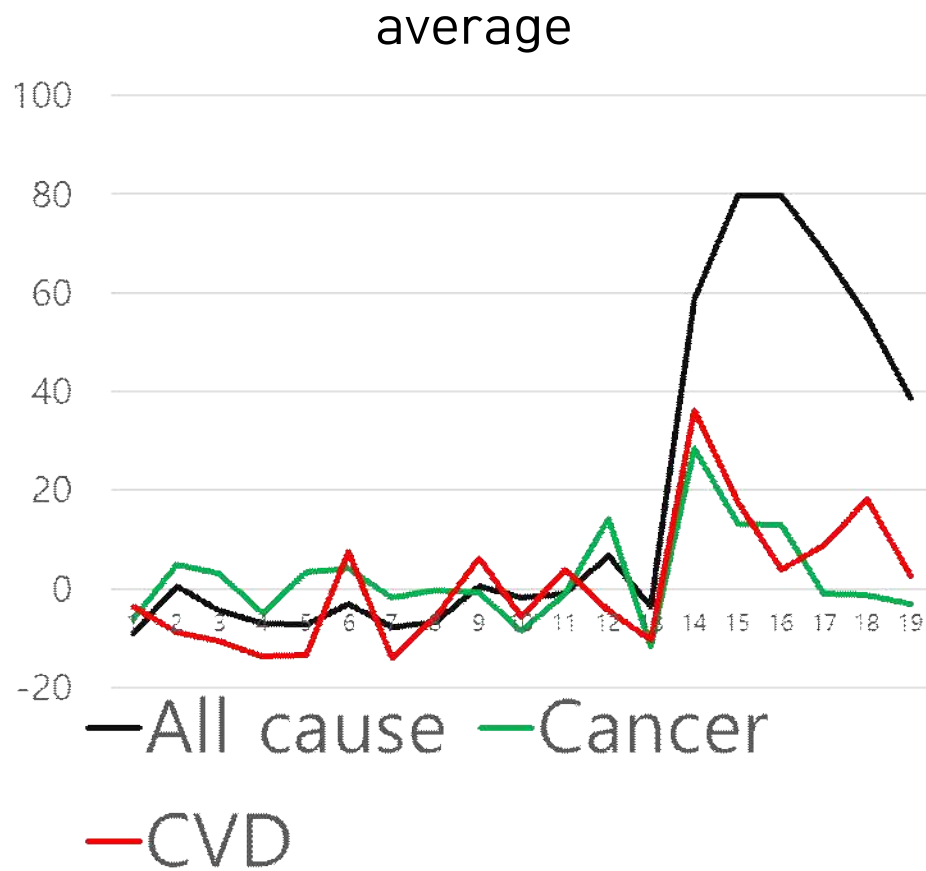
Cases, Deaths, and Case-Fatality Rates from COVID-19 With and Without Adjustment for Population Size in 16 Countries / Regions as of April 24, 2020

Countries	Cases	Cases per million	Deaths	Deaths per million	Case-Fatality
<b>United States</b>	873,137	2,625.2	50,106	150.6	5.7%
<b>Switzerland</b>	28,677	3,413.9	1,578	187.9	5.5%
<b>Sweden</b>	17,567	1,722.3	2,152	211.0	12.3%
<b>Spain</b>	219,764	4,395.3	22,524	450.5	10.2%
<b>France</b>	185,023	2,729.0	21,889	322.8	11.8%
<b>Germany</b>	153,584	1,919.8	5,577	69.7	3.6%
<b>Italy</b>	189,973	3,044.4	25,549	409.4	13.4%
<b>Netherlands</b>	36,727	2,122.9	4,304	248.8	11.7%
<b>Canada</b>	43,407	1,154.4	2,250	59.8	5.2%
<b>United Kingdom</b>	144,632	2,199.4	19,559	297.4	13.5%
<b>Hong Kong</b>	1,035	142.8	4	0.6	0.4%
<b>Singapore</b>	12,075	1,947.6	12	1.9	0.1%
<b>South Korea</b>	10,708	206.7	240	4.6	2.2%
<b>Taiwan</b>	428	18.1	6	0.3	1.4%
<b>Mainland China</b>	82,805	59.6	4,632	3.3	5.6%
<b>Japan</b>	12,368	98.5	328	2.6	2.7%

<https://www.bloomberg.com/graphics/2020-coronavirus-cases-world-map/?srnd=premium>

<https://www.census.gov/data-tools/demo/idb/region.php?T=13&RT=0&A=both&Y=2019,2020&C=CA,CH,FR,GM,HK,IT,JA,KS,NL,SN,SP,SW,SZ,TW,UK,US&R=0>

# Excess mortality by week of calendar year and cause: Scotland 2020 vs 2015-2019 average



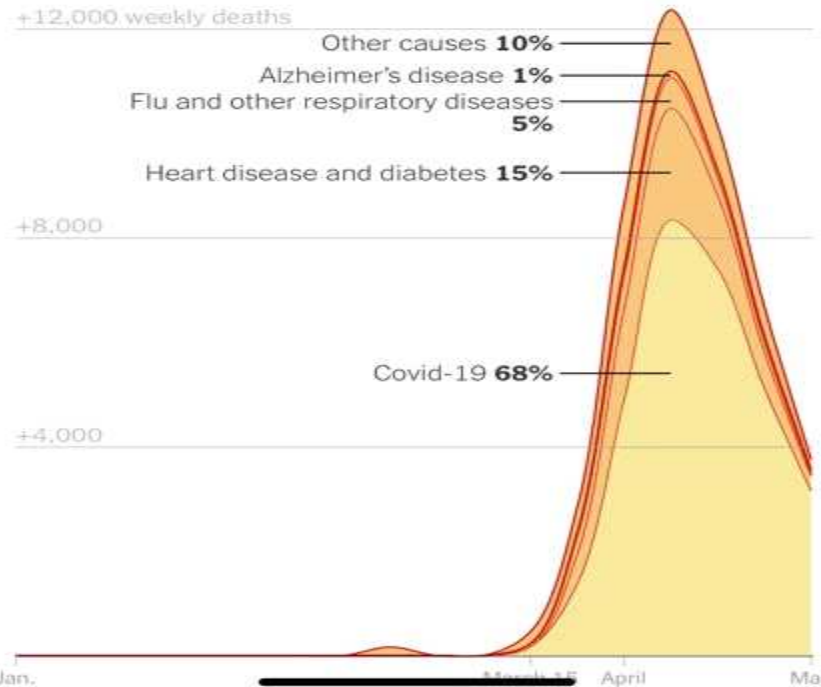
Data source: <https://www.nrscotland.gov.uk/covid19stats>

(Reproduced by Dr. Wild's presentation)



## There Has Been an Increase in Other Causes of Deaths, Not Just Coronavirus

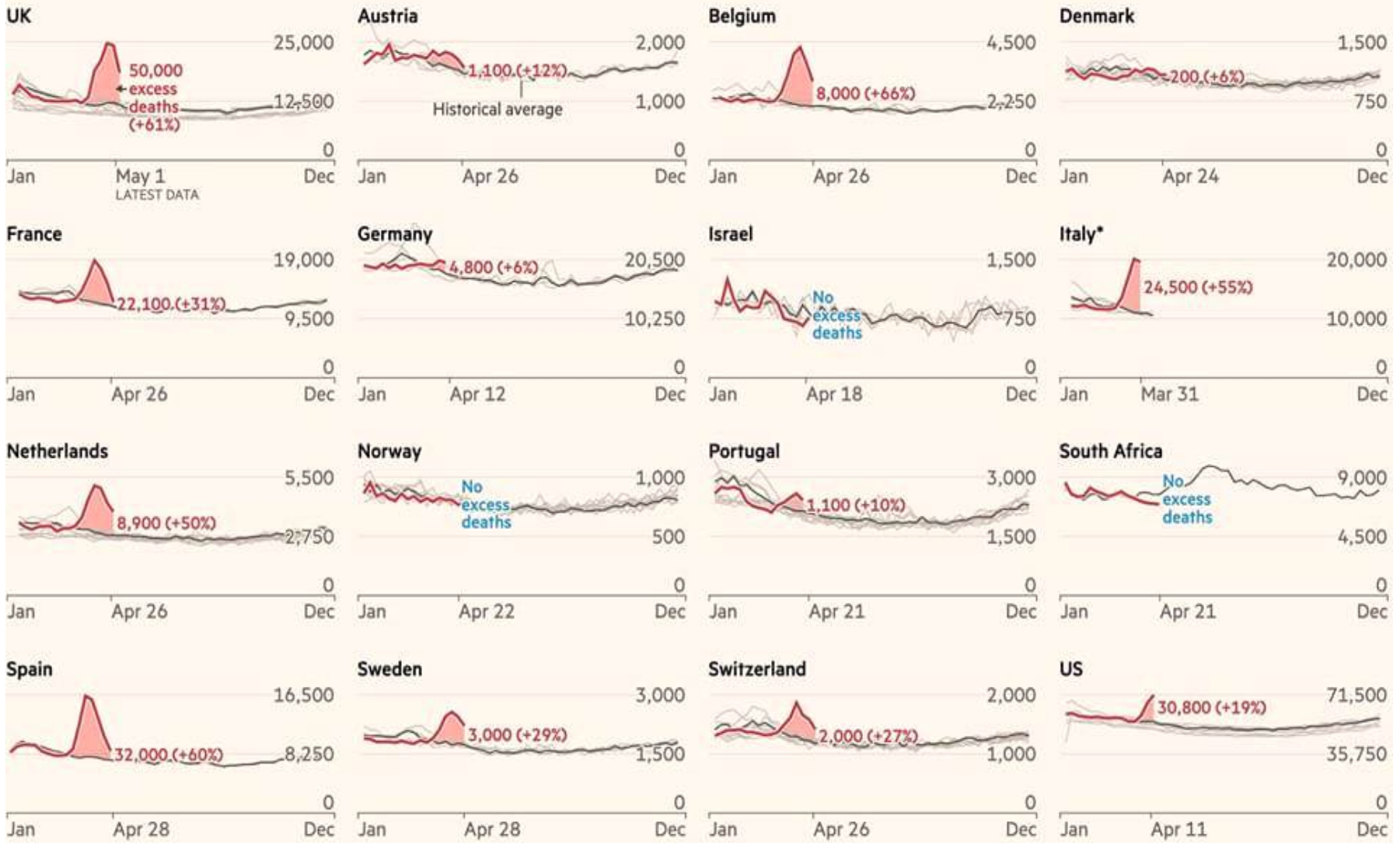
By Denise Lu June 1, 2020

This chart shows **deaths above normal** in New York and New Jersey. The percentages are shares of total excess deaths from March 15 to May 2.



# Death rates have climbed far above historical averages in many countries that have faced Covid-19 outbreaks

Number of deaths per week from all causes, 2020 vs recent years:   Shading indicates total excess deaths during outbreak

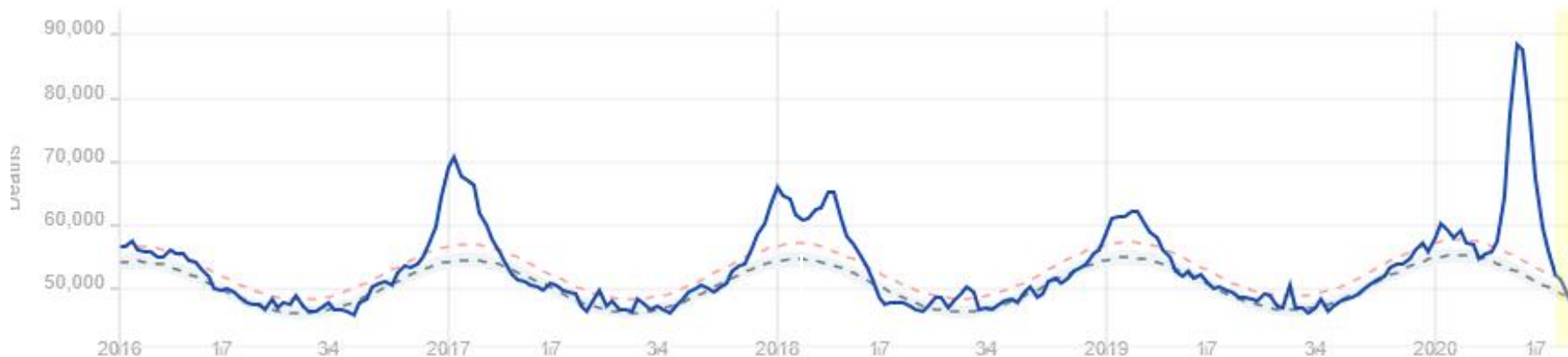


\*Italian data are a representative sample of 86% of the country  
 Source: FT analysis of mortality data. Data updated May 12.  
 FT graphic: John Burn-Murdoch / @burnmurdoch  
 © FT

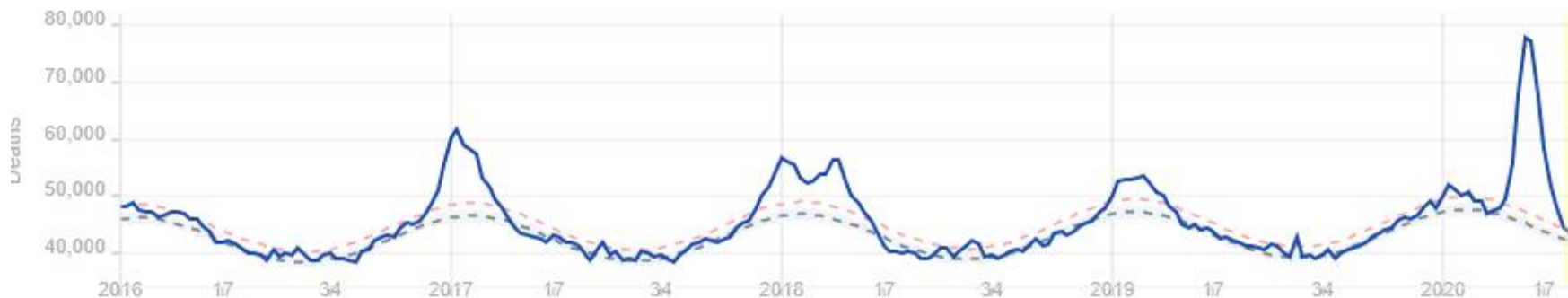
# EUROMOMO

Official national mortality statistics are provided weekly from the 24 European countries in the EuroMOMO collaborative network, supported by the European Centre for Disease Prevention and Control (ECDC) and the World Health Organization (WHO), and hosted by [Statens Serum Institut](#), Denmark.

All age



65+





# Importance of maintaining regular healthcare function in the middle of COVID-19 crises

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- 155-country survey shows severe disruption to services for noncommunicable diseases
  - hypertension treatment,
  - treatment for diabetes,
  - cancer treatment,
  - cardiovascular emergencies &
  - rehabilitation
- Maintain ICU and ER function for critical patients
  - : Integrated and coordinated approach !

# 코로나 팬데믹:

-왜 위기인가 ?

→ Perfect crisis with huge impact

-위기의 성격은 ? :

-어떻게 이겨낼 수 있나 ?

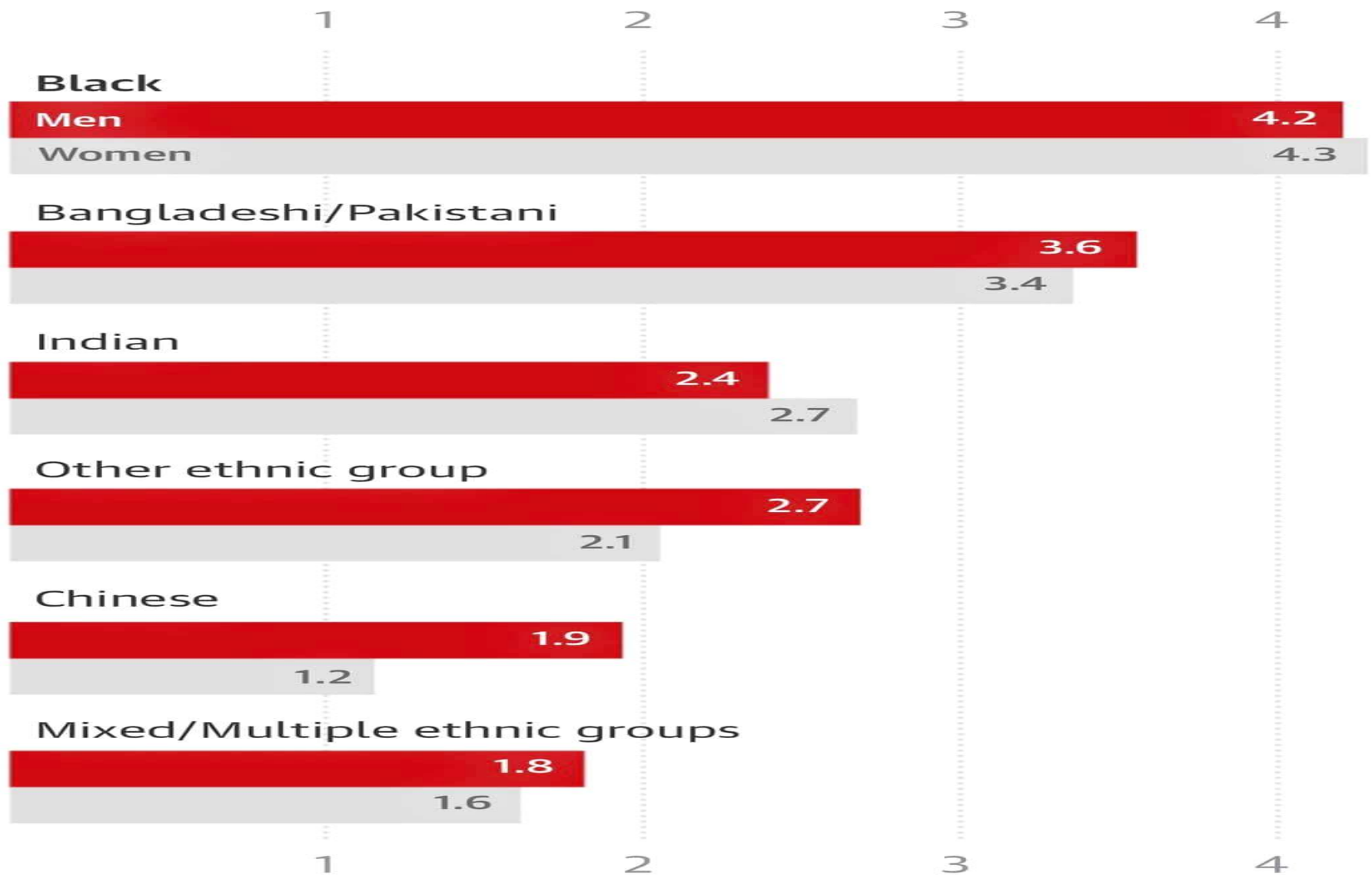
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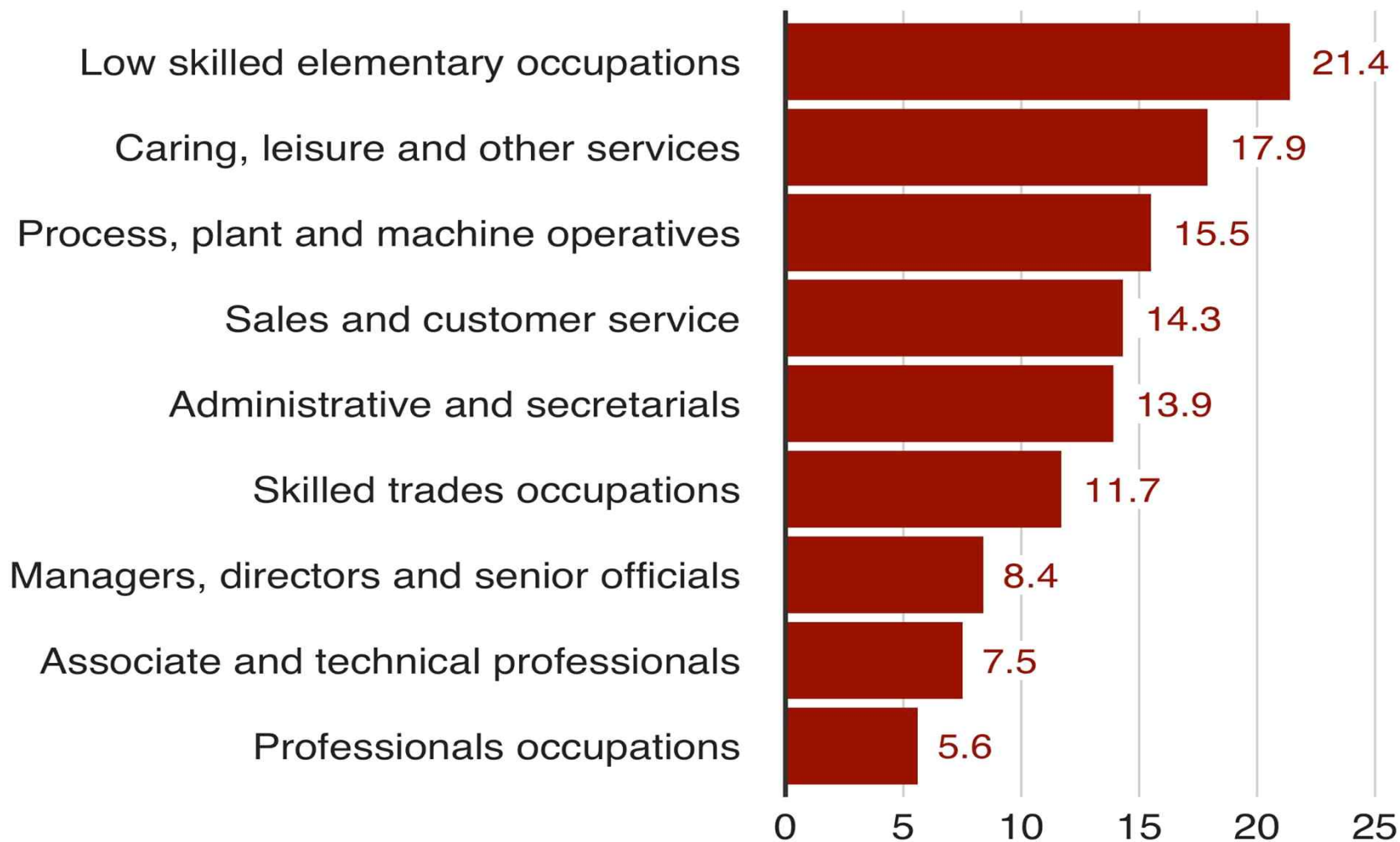
## The likelihood of dying from Covid-19 compared with white ethnicity

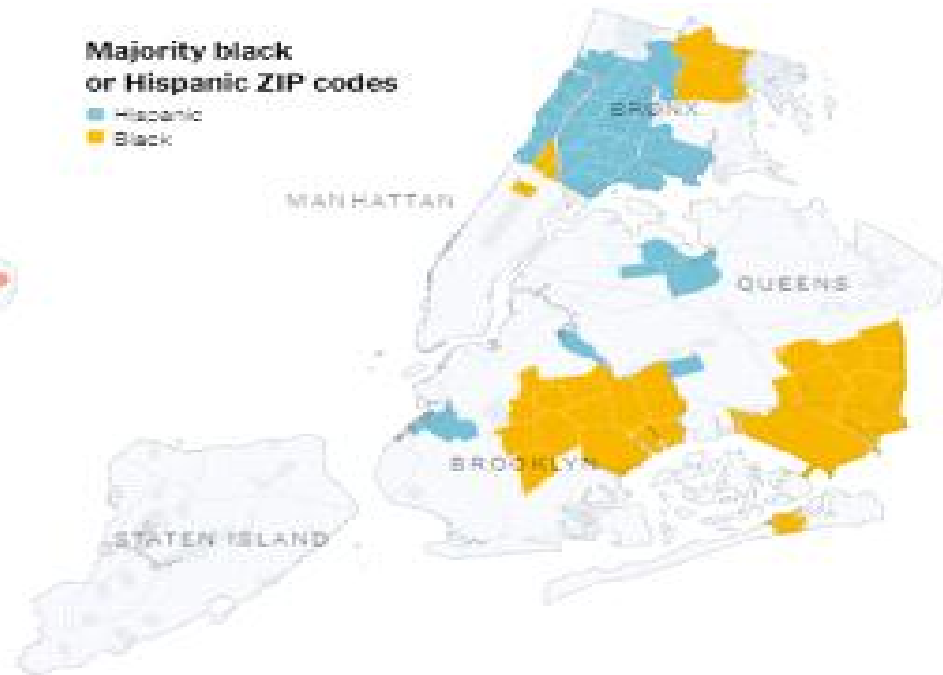
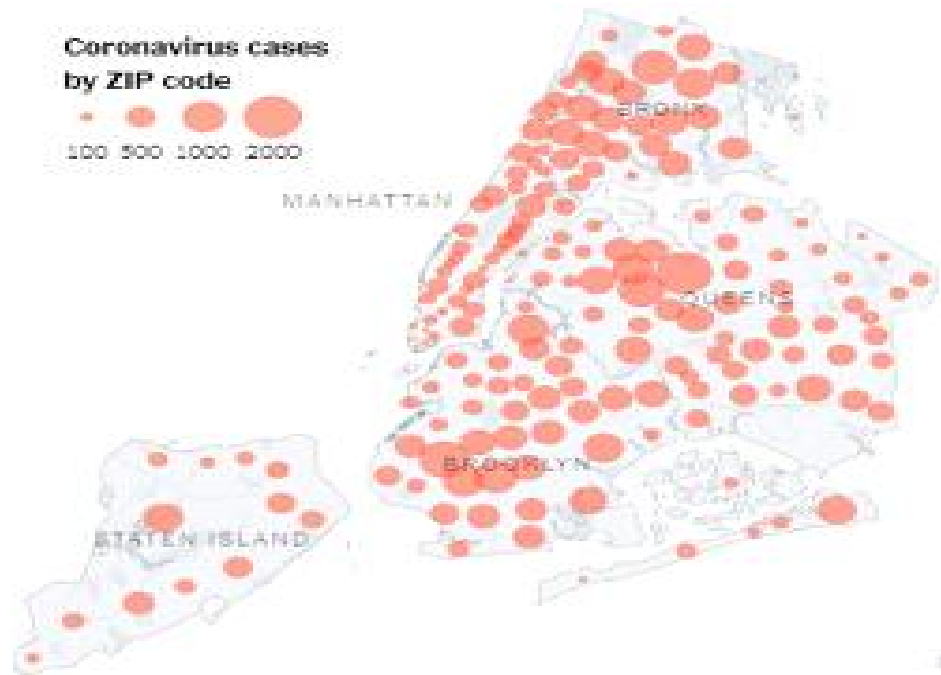


Guardian graphic. ONS. Note: Age-adjusted-odds ratios for the risk of death involving Covid-19 by ethnicity, 2 March to 10 April 2020

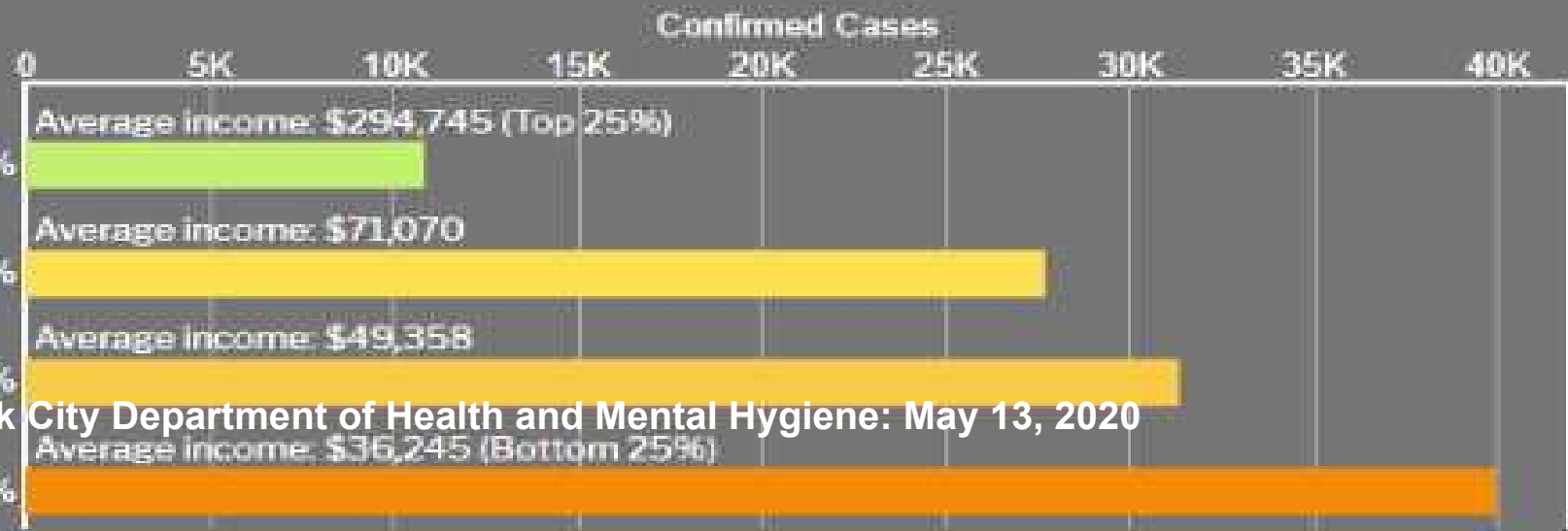
# Occupations with the highest death rate linked to Covid-19

Deaths in England and Wales, per 100,000 workers adjusted for age





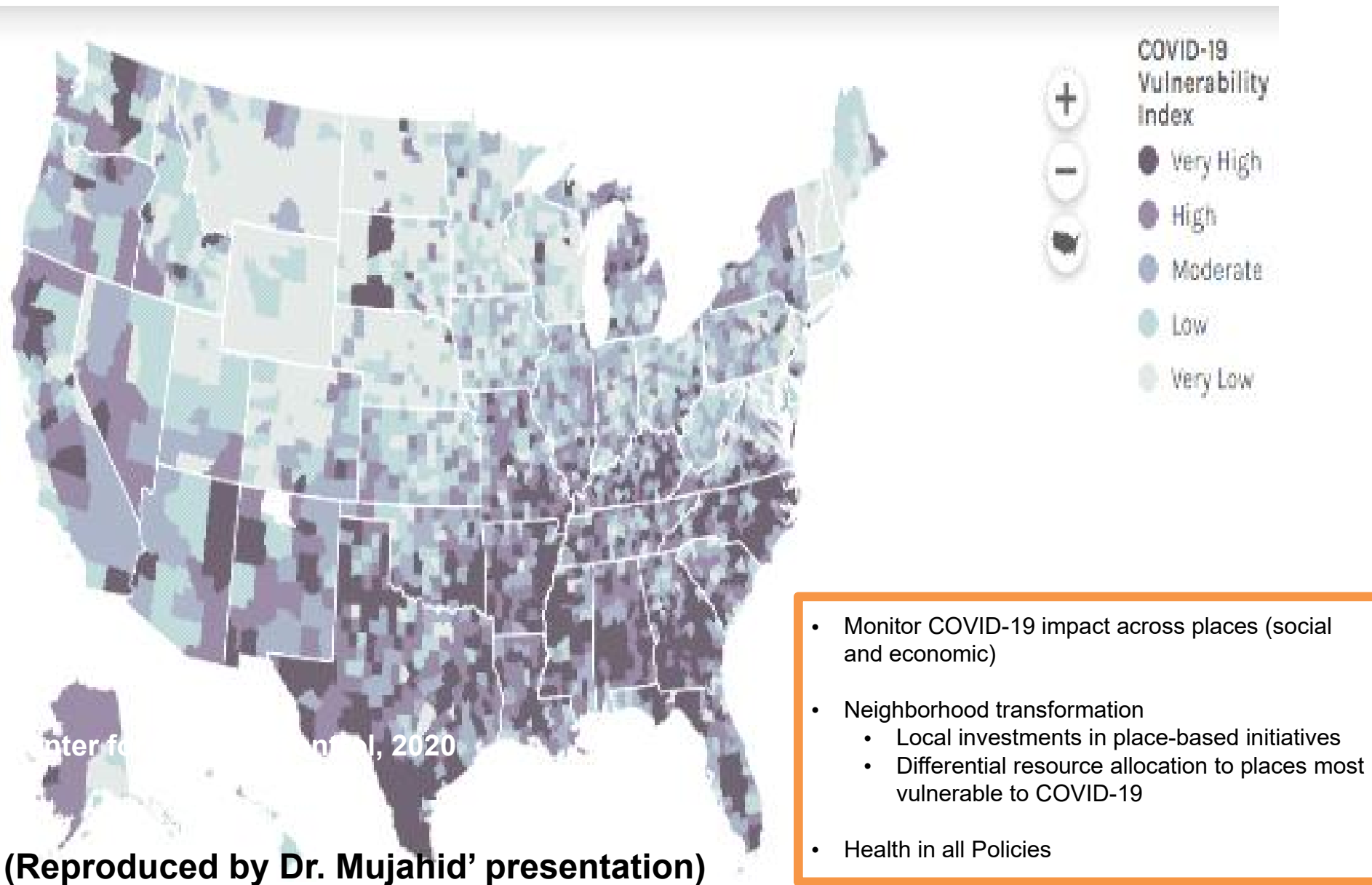
## COVID-19 Cases in New York City By Income Percentile



New York City Department of Health and Mental Hygiene: May 13, 2020

(Reproduced by Dr. Mujahid' presentation)

# COVID-19 Vulnerability Index



(Reproduced by Dr. Mujahid' presentation)

No war, no recession, no previous pandemic has had such a dramatic impact on emissions of CO2 over the past century as Covid-19 has in a few short months.

## Global CO2 emissions, 1900-present

Billion tonnes of CO2 per year



Source: Global Carbon Project, CDIAC & IEA

BBC

**Unrivalled drop in carbon output !!**

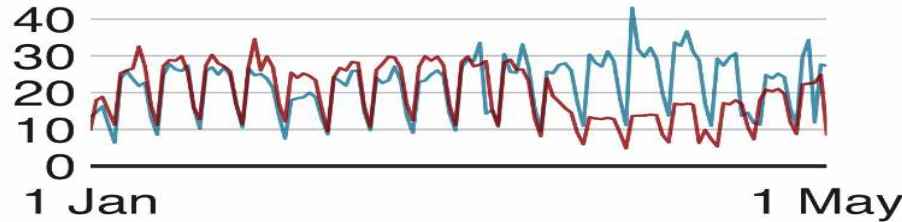


# Traffic flows in selected cities

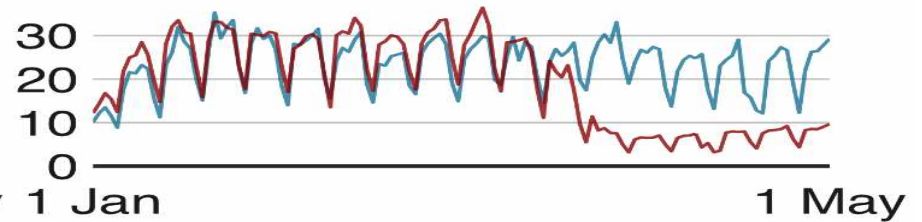
Average congestion per day

— 2019 — 2020

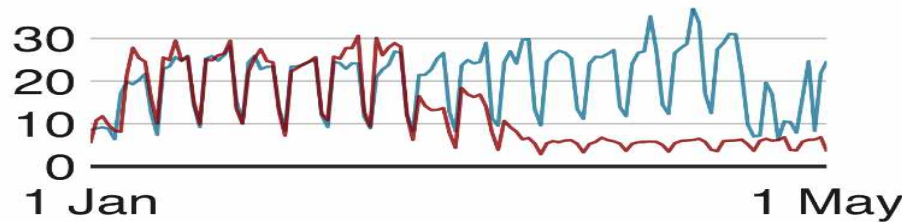
## Berlin



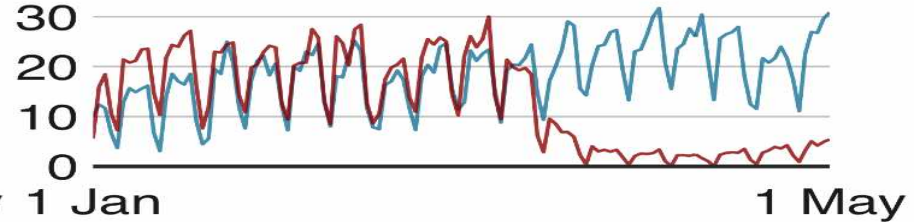
## London



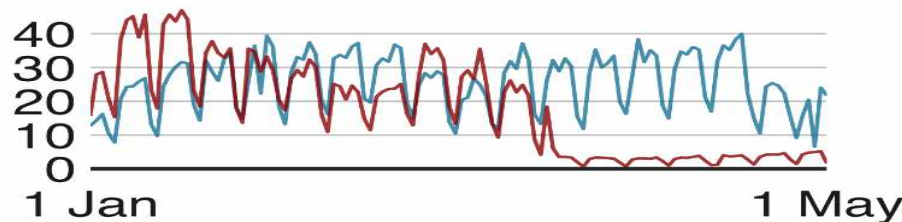
## Milan



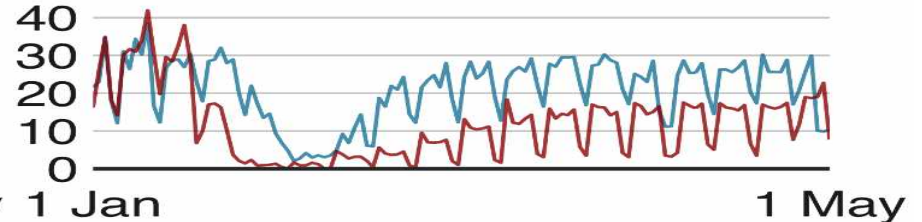
## New York



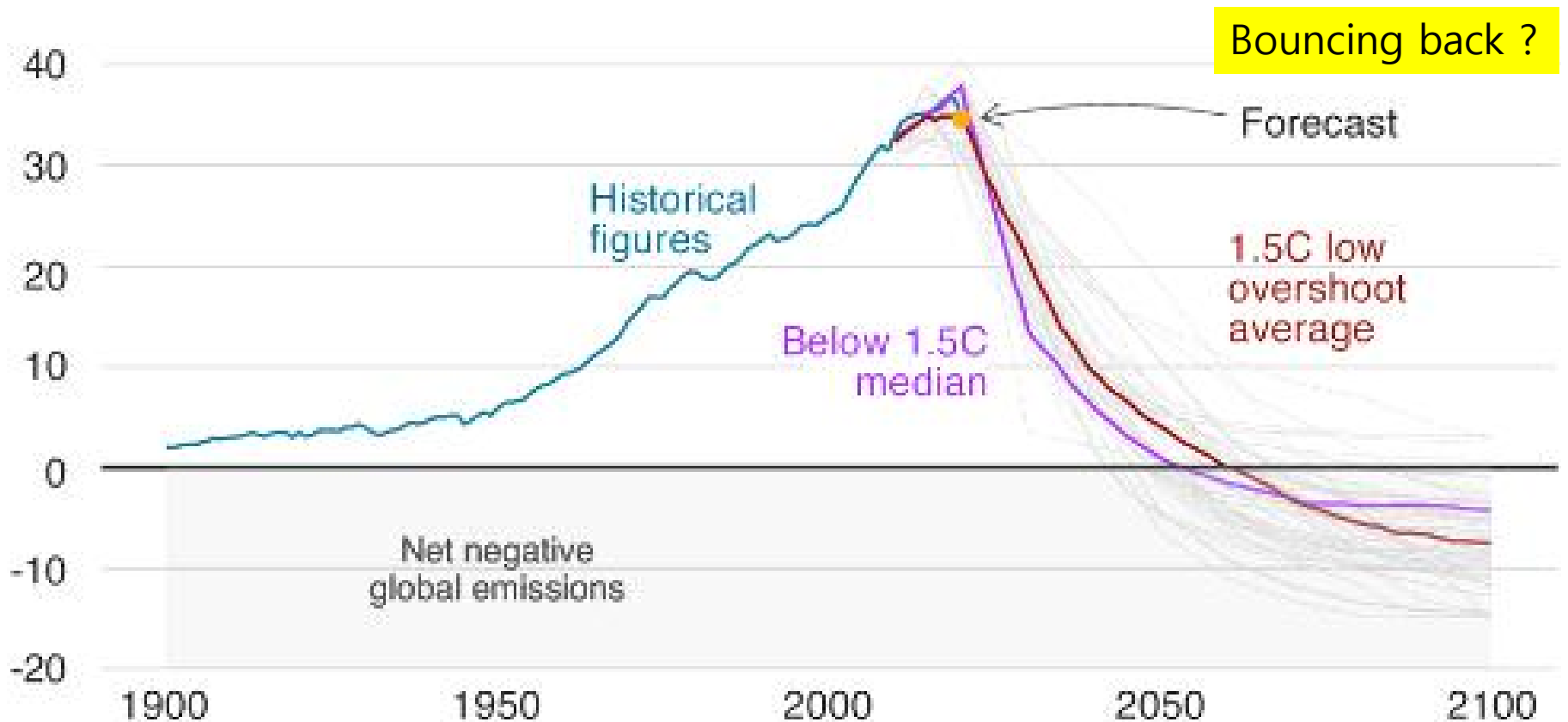
## Paris



## Shanghai



# Keeping temperature rise to 1.5C



Bouncing back ?

Forecast

Historical figures

1.5C low overshoot average

Below 1.5C median

Net negative global emissions

Source: Glen Peters, IAMC, IIASA



**"Such emissions reductions will not happen via lockdowns and restrictions, but by climate policies that lead to the deployment of clean technologies and reductions in demand for energy." (Erik Holm Reiso, from Rystad Energy)**

# 코로나 팬데믹:

-왜 위기인가 ?

→ Perfect crisis with huge impact

## -위기의 성격은 ?

→ Widening social inequity in its impact

→ Big challenge for climate change

: Risk and Opportunity

-어떻게 이겨낼 수 있나 ?

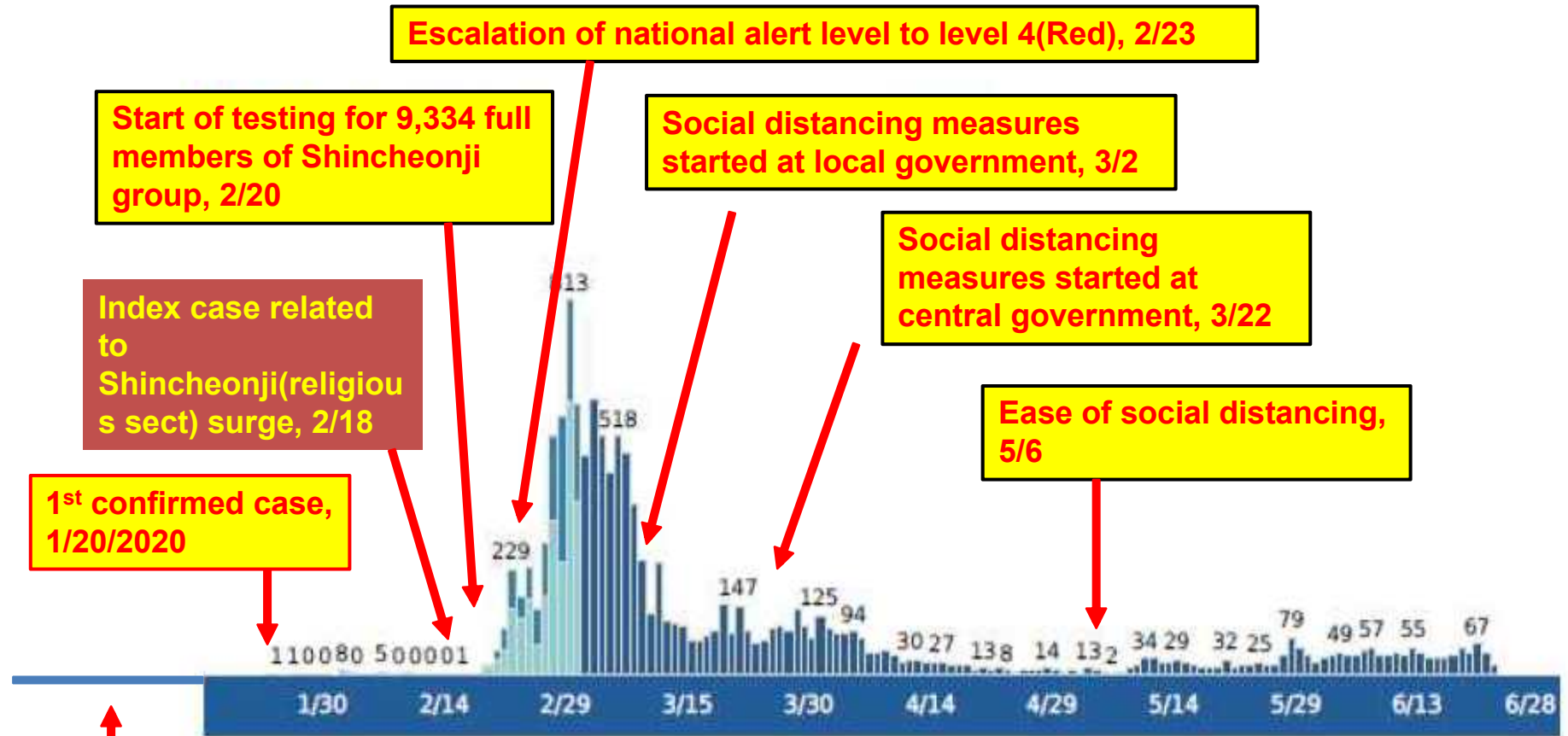
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I. 왜 위기인가 ?

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# Response to COVID-19 epidemic in Korea, as of 22 June, 2020



Escalation of national alert level to level 4(Red), 2/23

Start of testing for 9,334 full members of Shincheonji group, 2/20

Social distancing measures started at local government, 3/2

Index case related to Shincheonji(religious sect) surge, 2/18

Social distancing measures started at central government, 3/22

1<sup>st</sup> confirmed case, 1/20/2020

Ease of social distancing, 5/6

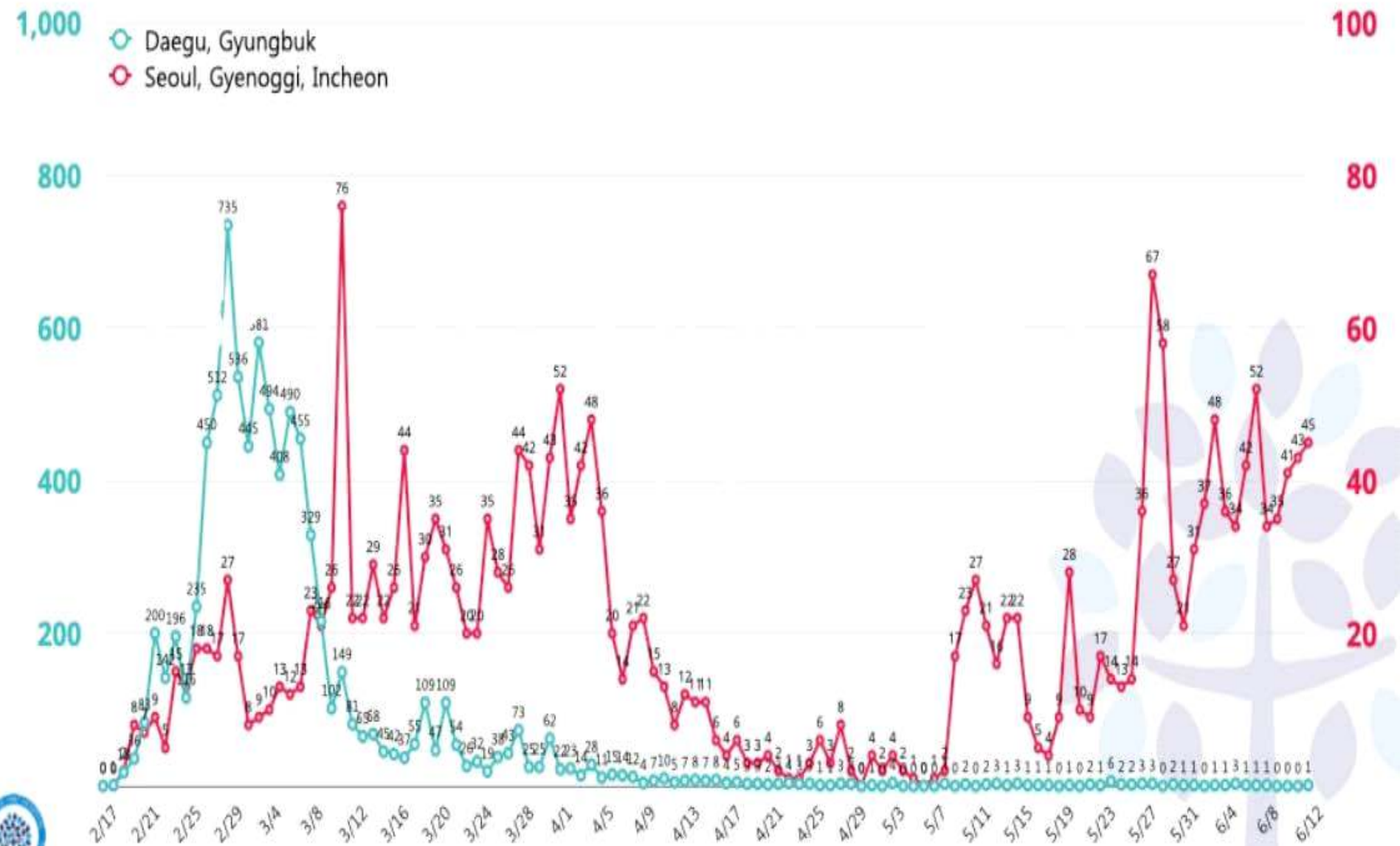
그림 2. 코로나(COVID)-19 전국 확진자 추이(20.6.22.10시 기준, 경기도감염병관리지원단)

COVID-19 test kits developed and available at KCDC central lab, Mid-January

Test available at public health laboratories of local government, 1/31

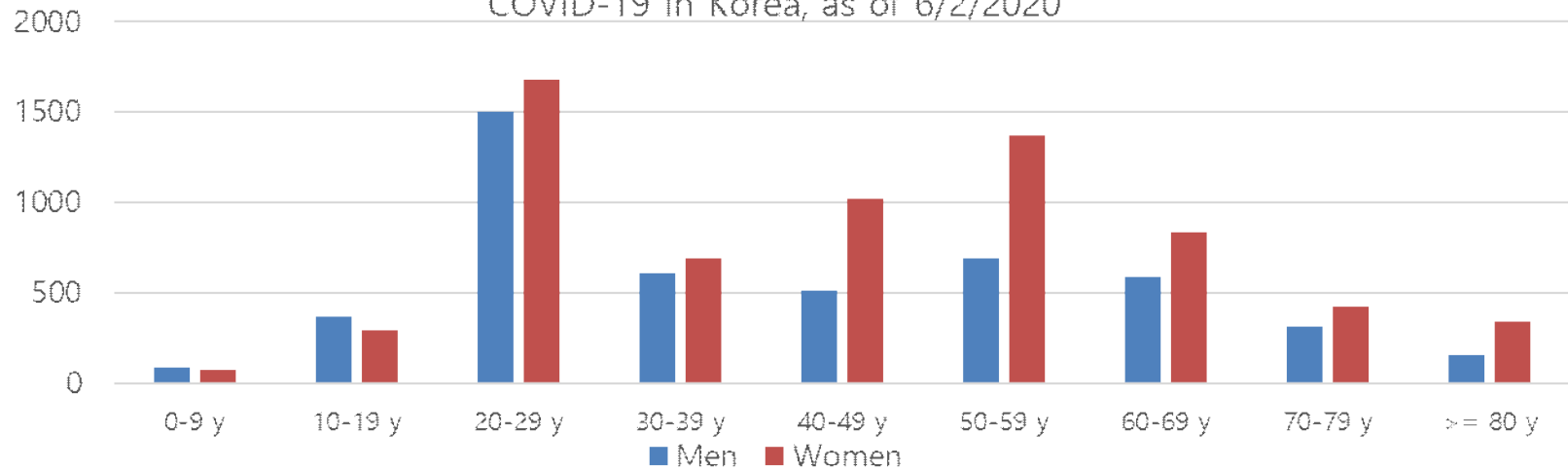
Test available at healthcare facilities, 2/7

# Epidemiologic curve in Korea

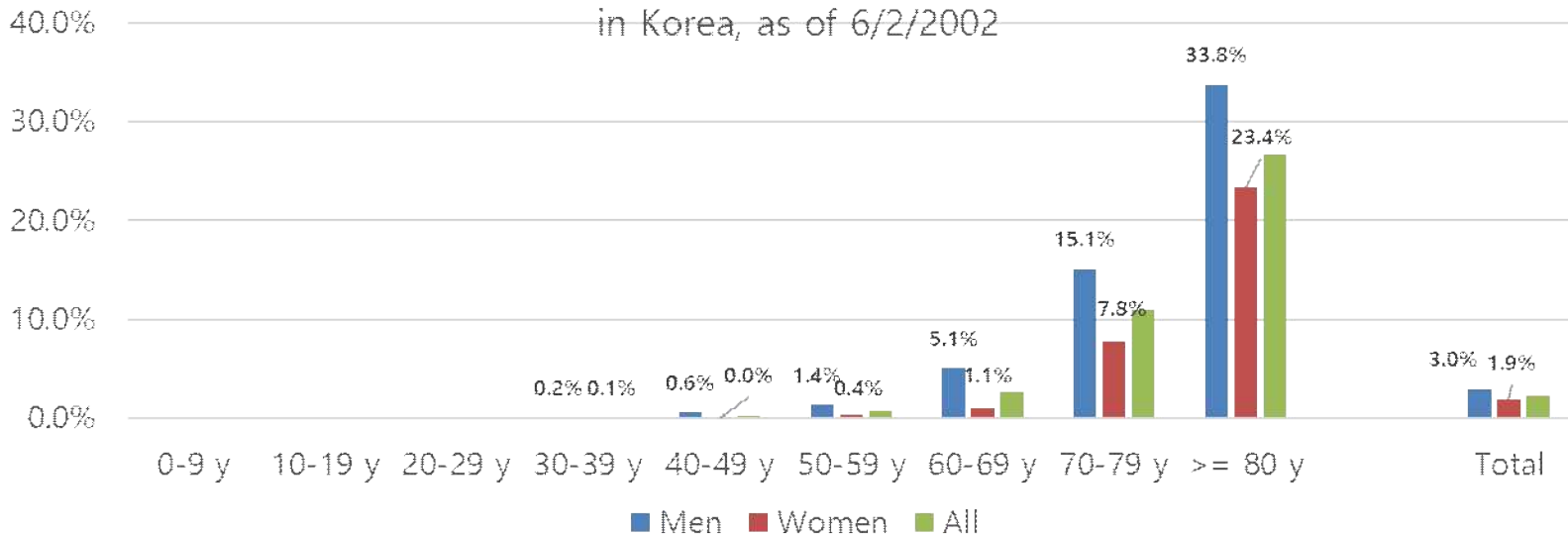


Source: KCDC

Age-specific sex distribution of confirmed cases of COVID-19 in Korea, as of 6/2/2020



Age-specific case-fatality rates of COVID-19 by sex in Korea, as of 6/2/2020



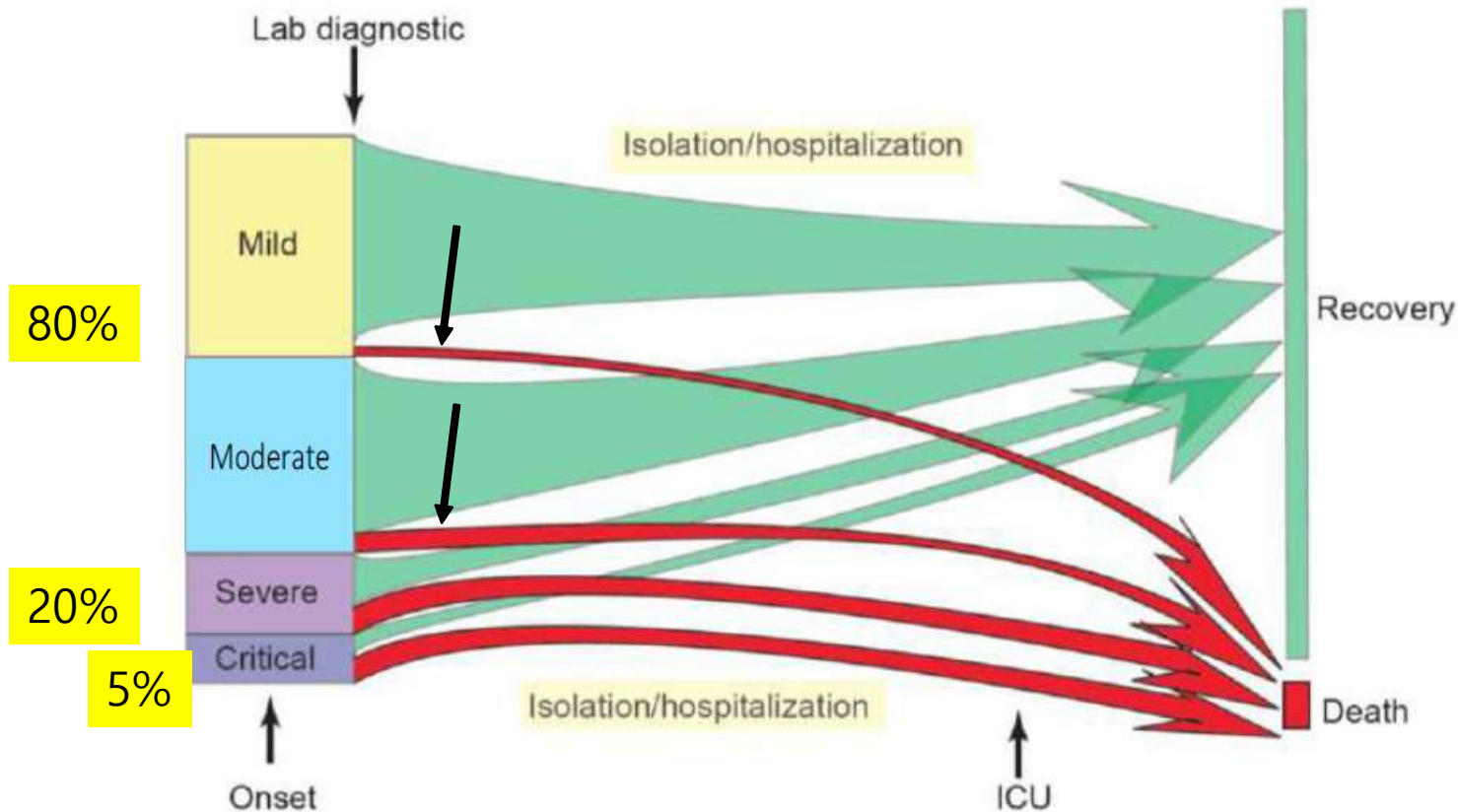
# 우리나라에서 코로나19 전파의 주요 경로

---

- 교회, 신천지교 등
- 의료기관, 요양병원, 요양원 등
- 밀집 작업장/유흥시설: 구로콜센터, 물류센타 / 나이트클럽, 노래방, 방문판매점, ... .
- 가족내 전파
  
- 역학적 고리를 알 수 없는 확진자: ~ 10%
- 지역사회에서 미확인된 조용한 전파가 어디에 ? 그 영향은 ??  
: 지역사회 기반 항체 검사
- 고위험시설: 위험도 평가 ?



# Pattern of disease Progression in China



**Figure 5. Pattern of disease progression for COVID-19 in China**

Note: the relative size of the boxes for disease severity and outcome reflect the proportion of cases reported as of 20 February 2020. The size of the arrows indicates the proportion of cases who recovered or died. Disease definitions are described above. Moderate cases have a mild form of pneumonia.

**Report of the WHO-China Joint Mission on Coronavirus Disease 2019 (COVID-19)**

# 우리나라에서 코로나19 성과에 기여한 요인: 3T + 2P

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- 1) 사전준비와 조기진단: **Preparedness, mass Testing, early isolation**
- 2) 공격적 접촉자 관리: **Aggressive contact tracing**
- 3) 효율적 치료관리: **Efficient treatment !!!**
- 4) 개인보호장비: **Personal protective measures: masks.. , !!**
- 5) 공중보건인프라: **Public health infrastructure**

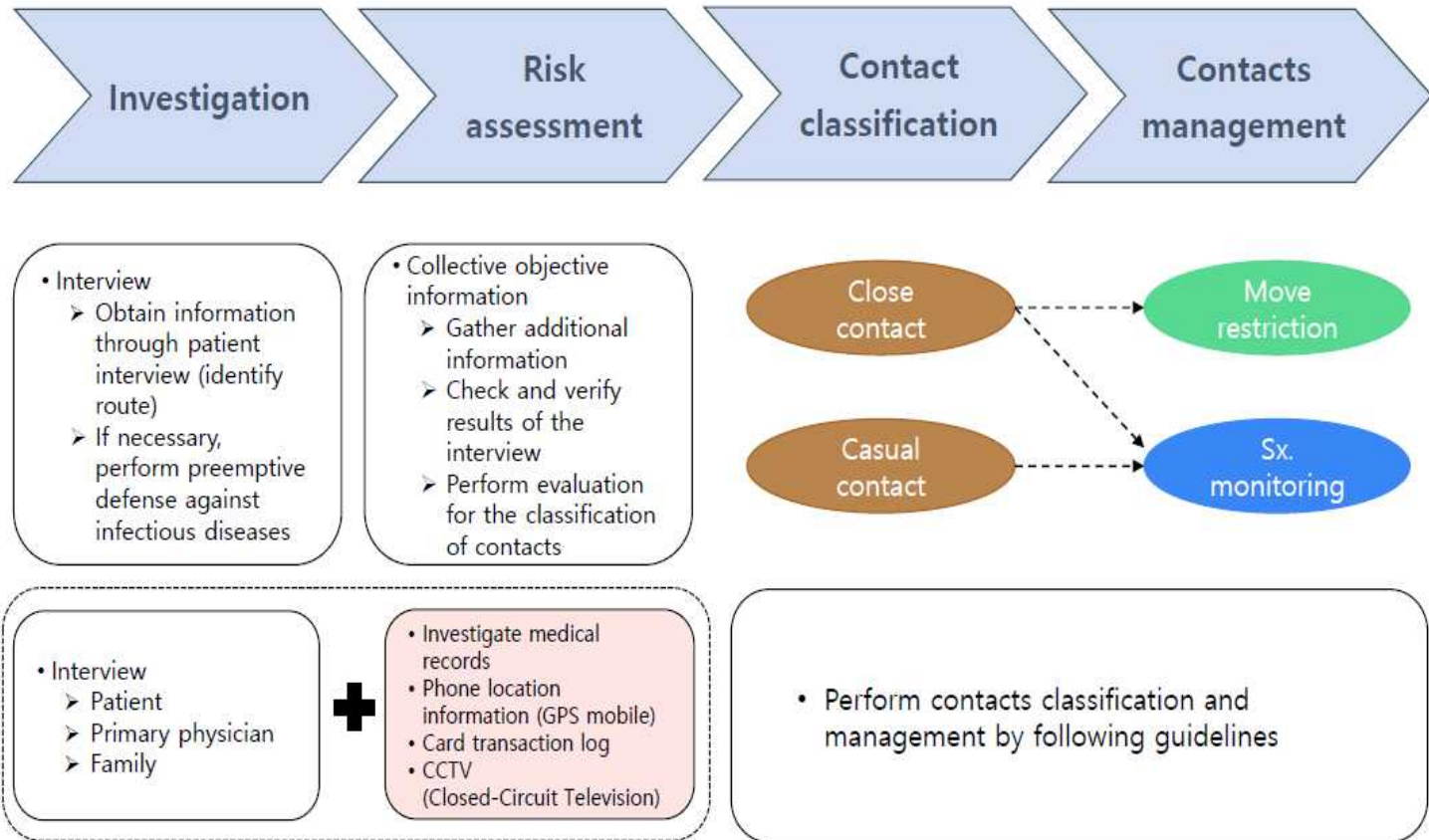
# 1) Early preparedness for mass testing

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- Corona test kits, developed and approved in Mid-January, before first case identified on 1/20 in Korea
  - ~120 locations: 23 public laboratories, 83 medical institutions, and 14 entrusted testing facilities - that provide diagnostic tests
- **Capacity** : Average ca. 12,000/day / Max. ca. 30,000/day
- **Turn Around Time: 6 ~ 24hrs**
- **Screening stations for sample collection:** ~600 sites nationwide, including drive-through and walk-in clinics

## 2) Active tracing and management for close contacts

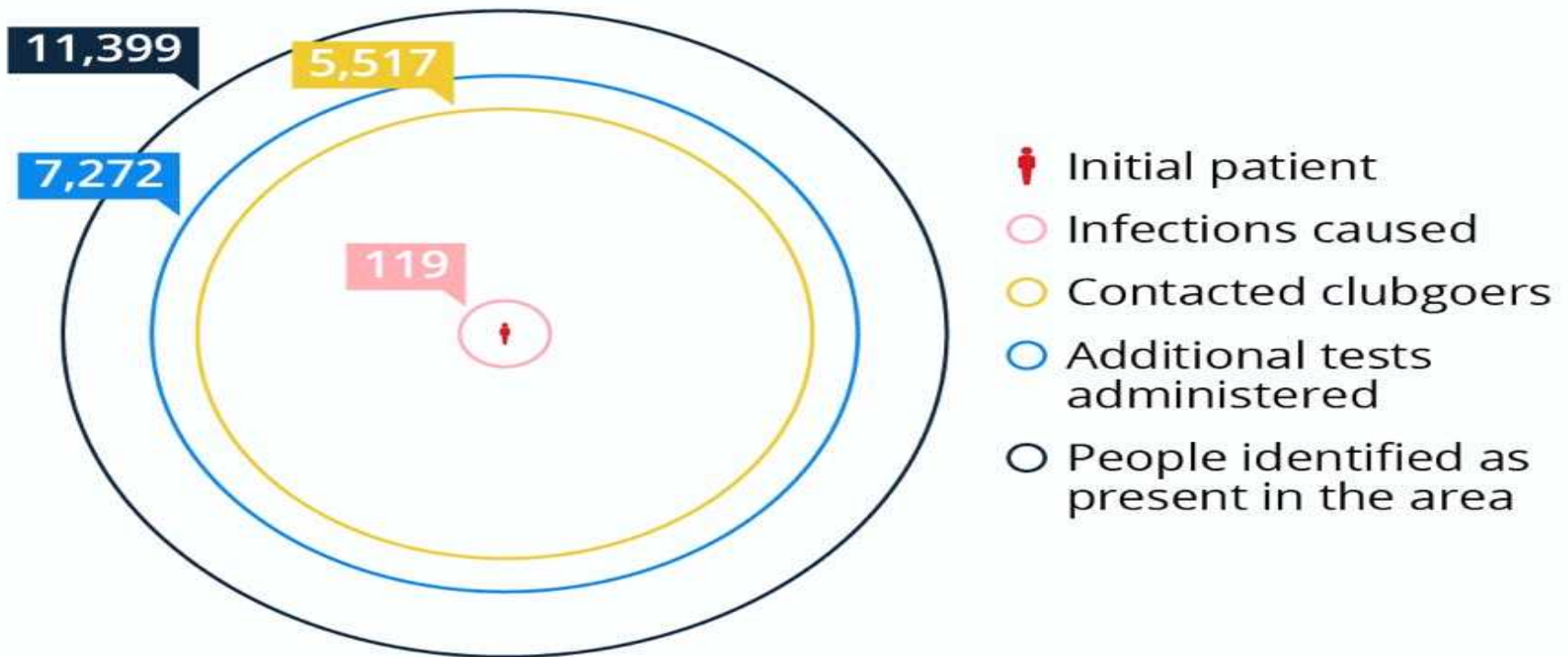
### Contact tracing strategy : stepwise approach



➤ **Issues to be considered: efficiency vs privacy protection**

# One Infected Clubgoer Triggers Massive Response

Number of people identified as potentially at risk from one COVID-19-infected clubgoer in Seoul, South Korea



As of May 11-13

Sources: Korean Centers for Disease Control & Prevention, media reports



# Ethical considerations to guide the use of digital proximity tracking technologies for COVID-19 contact tracing

Interim guidance

28 May 2020



Yet such uses of data may also threaten fundamental human rights and liberties during and after the COVID-19 pandemic.

(디지털 근접 추적 기술은) 근본적 권리와 자유를 위협할 수 있다.

is a need for laws, policies and oversight mechanisms to place strict limits on the use of digital proximity tracking

이렇게 수집된 정보의 활용과 이렇게 생산된 자료를 이용한 연구에는 엄격한 제한이 있어야 하고, 이를 위한 법, 정책, 그리고 감독기전이 필요하다.

### 3) Efficient Treatment

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- Rapid surge in confirmed cases in Daegu area (Shincheon-ji related)
  - Shortage of healthcare capacity in early phase of this surge
- ~~ICU in tertiary hospitals~~ ~~Isolated beds in (mainly public-sector) hospitals, nationwide~~ ~~Community treatment center (isolated beds in recreation facilities, nationwide)~~  
on clinical severity (protocol) applied
  - ICU in tertiary hospitals
  - Isolated beds in (mainly public-sector) hospitals, nationwide
  - Community treatment center (isolated beds in recreation facilities, nationwide)

## 4) Personal Protective measures

---

➤ Personal protective measures: wearing masks, washing hands,...

➤ **Social distancing since early epidemic phase**

: Inner city movement in Daegu area reduced !

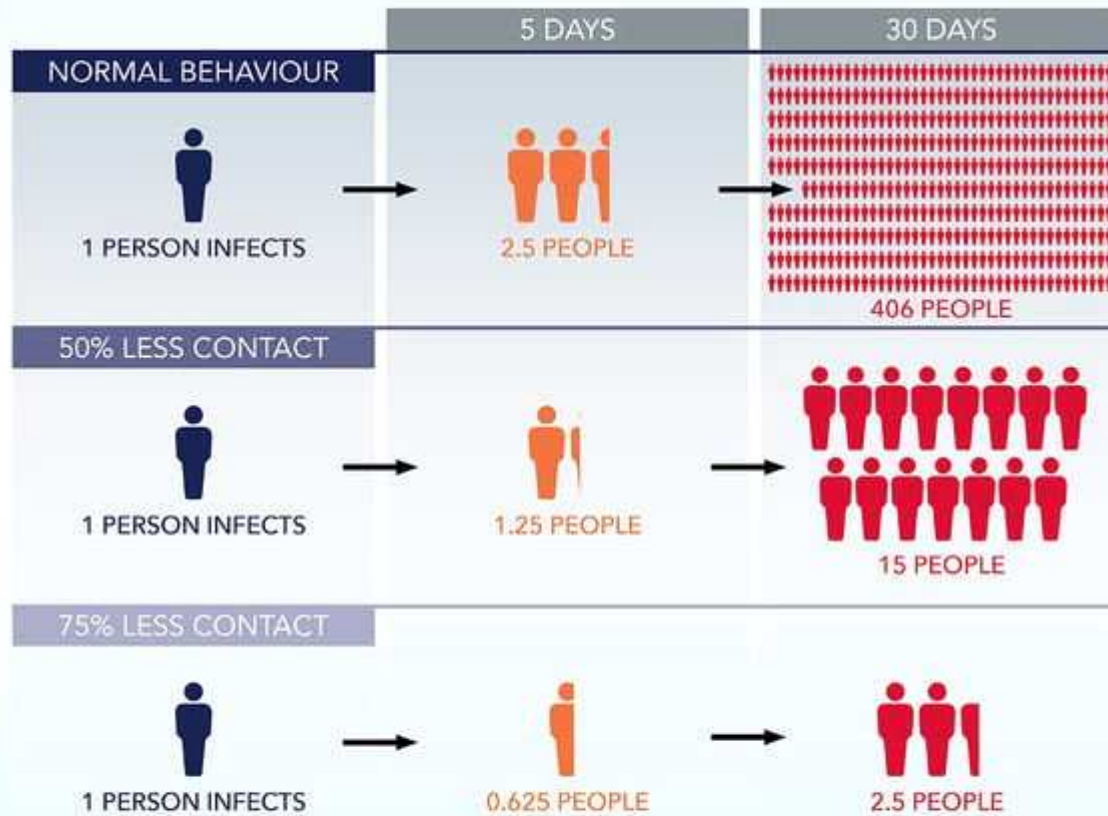
: Soft physical distancing in other area of South Korea, ,  
Metropolitan area-focused, without imposing draconian  
lockdown

→ effect of less harsh lockdown on controlling the outbreak ??



# THE VITAL IMPORTANCE OF SOCIAL DISTANCING

How a reduction in social contact can reduce the spread of Coronavirus



**EXPRESS**

Source: Signer Laboratory / Gary Warshaw


## 5) 전국민 의료보험과 공중보건조직 인프라

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- 전국민 의료보험
- 전국 보건소 조직: ~250개, 감염병 대응 활동, 역학조사, 접촉자 관리
- 역학조사관, **Epidemic Intelligence Service(EIS) officials**  
: 중앙 지방에서 다수 선정, 어떻게 양성되나 ??
- 광역 시도 감염병관리지원단 **Infectious Disease Control Center(IDCC) in most of the local governments**
- 보건소 감염병관리자 교육 프로그램 **FETP(Field Epidemiology Training Program)-f for public health officials working at the public health centers of all counties(~250)**
- **TTX(Table Top Exercise) for disease X (pneumonia family of unknown origin) in mid-Dec, 2019 by KCDC**

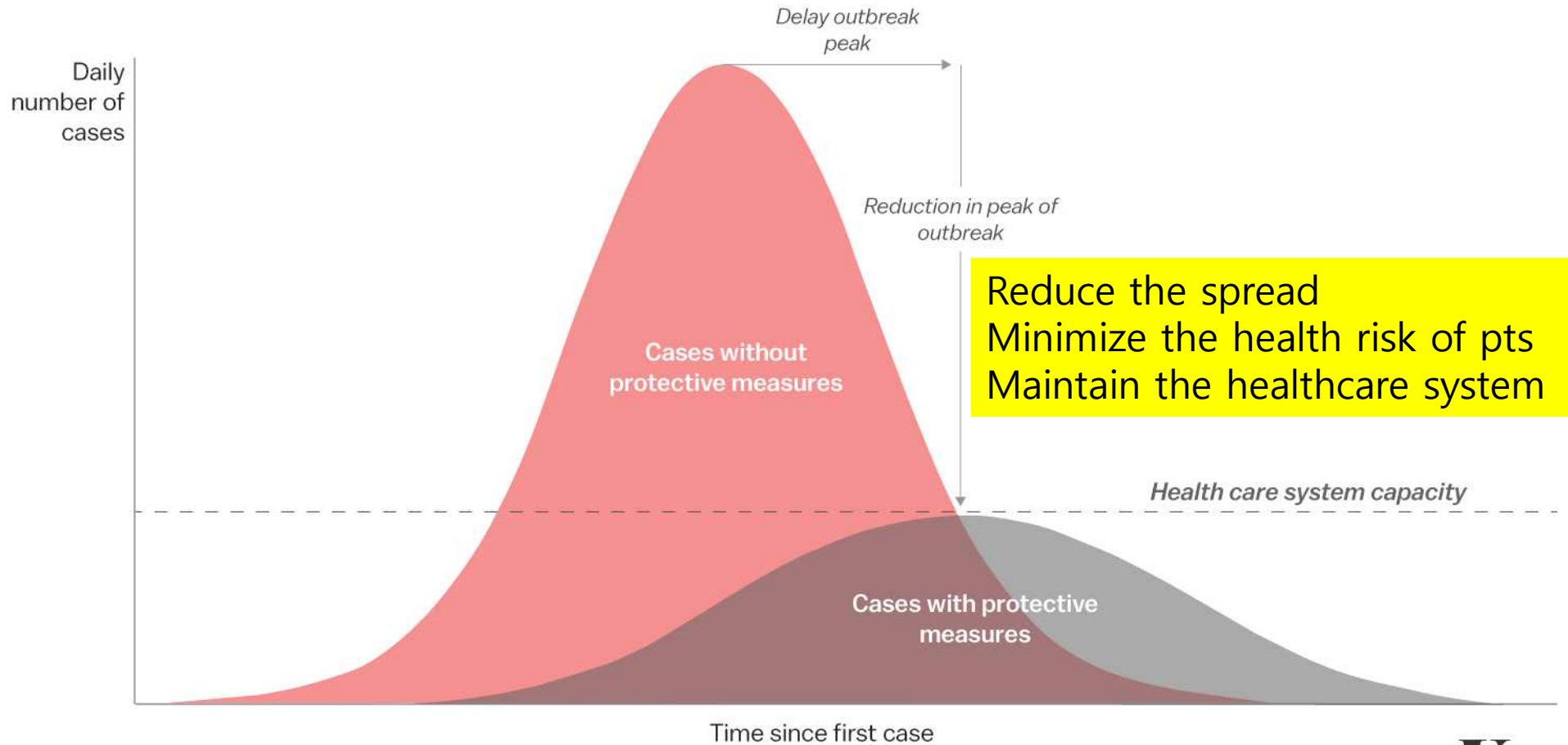
# Uncertainties persist in COVID-19 outbreak !

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-  symptomatic versus asymptomatic infections (Enrico Lavezzo et al., 4/18/2020 posted at <https://doi.org/10.1101/2020.04.17.20053157>)
- **% Asymptomatic** when diagnosed as COVID-19 positives in Korea (Korea CDC): undetected cases in the community
- The infection is **50-85 fold much more widespread** than indicated by the number of confirmed cases  
(Eran Bendavid et al., Preprint, <https://doi.org/10.1101/2020.04.14.20062463>)
- **No evidence** that the use of a serological test can show that an individual has **immunity or is protected from reinfection**  
(Van Kerkhove, WHO)

# Ultimate goal of response against COVID-19

## Flattening the curve



Source: CDC

Vox

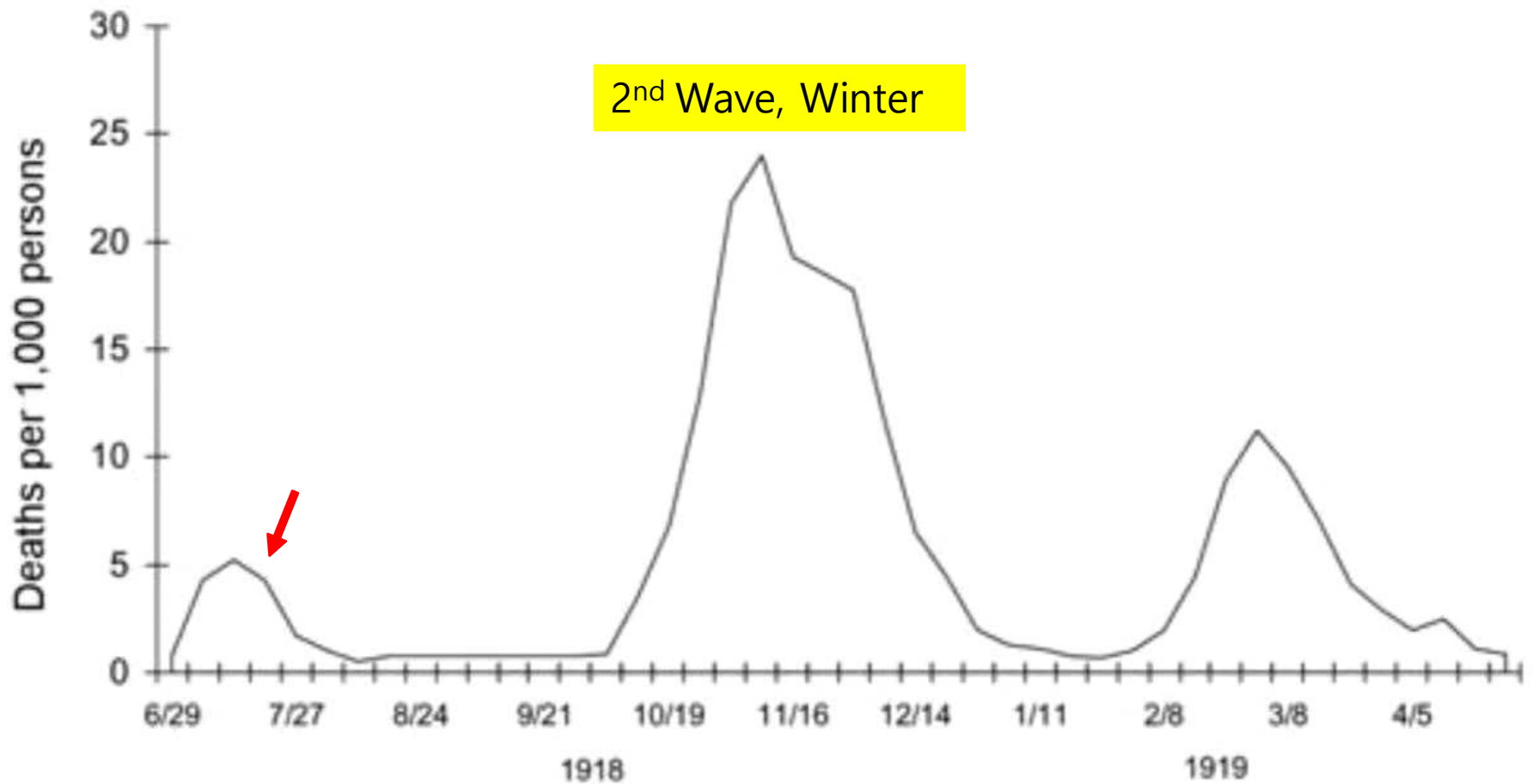


Figure 1. Three pandemic waves: weekly combined influenza and pneumonia mortality, United Kingdom, 1918–1919 (21).

# Basic principles for public health crisis preparedness and response

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➤ **All hazards approach**, not limited to one scenario !

: SARS, MERS, **COVID-19**, and next → ?

: optimal development of **capabilities** across scenario and better preparation for the **broad spectrum of potential risks**

→ **Public Health Crises Require All Hands on Deck**

➤ **3 Issues dealt in coping with the PH crises**

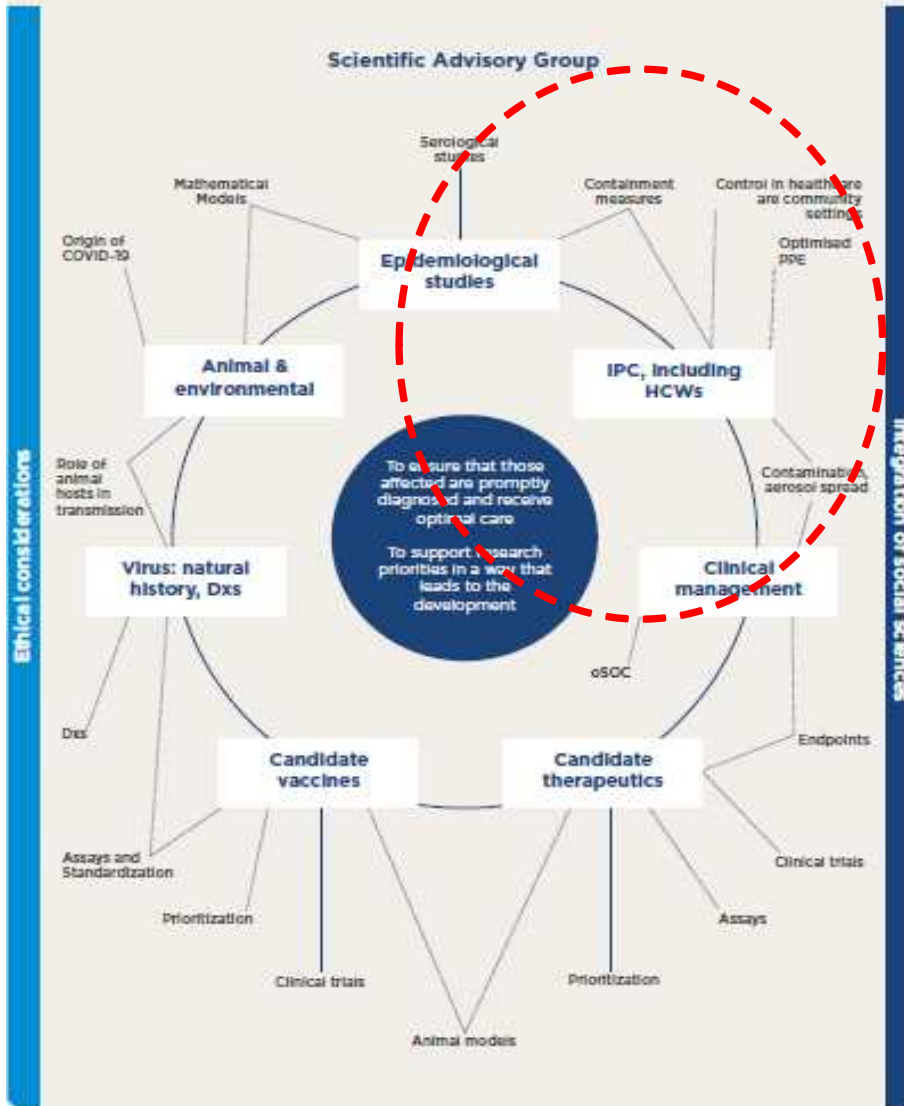
: **Medical issues, Public health issues**, Social issues

## 3 area for immediate preparedness and response to COVID-19

Domain	Response strategy
Medical	<ul style="list-style-type: none"><li>- Mobilization plan of healthcare capacities, assuming worst case scenario</li><li>- Maintain the regular function of health care service</li></ul>
Public health	<ul style="list-style-type: none"><li>- Building surveillance and monitoring system for early detection of small clusters</li><li>- Develop efficient and ethical way of epidemiologic investigation and contact tracing</li><li>- Building cooperative governance between central and local government</li></ul>
Social	<ul style="list-style-type: none"><li>- Sustainable crisis response system through civic participation</li><li>- Policy environment supporting crisis response</li></ul>
Scientific evidence	6) R&D governance and roadmap for epidemiologic



Figure 4. Schematic depiction of Thematic Areas and selected ad hoc independent expert groups under the leadership of the SAG



### Research priorities

Six key research priorities were identified for epidemiological studies for the COVID-19 outbreak, and these were grouped according to the four key domains of transmission dynamics, severity, susceptibility and control and mitigation measures.

	Research priority	Why?	What type of studies/research are needed?
<b>Transmission dynamics</b>	Clarify the relative importance of pre-symptomatic/ asymptomatic transmission (including distinction between virus shedding and infectious transmission)	If asymptomatic/ pre-symptomatic transmission is possible, risk of epidemic spread is significantly higher, important to understand this to accurately understand transmission dynamics for public health & hospital infection control.	Detailed reports of transmission events and symptomatic status of infectors; viral shedding data; special studies in households; Cruise and other closed settings; detailed analysis for clusters. Of note, WHO initiated a study looking at evacuated cohorts, and is undertaking intensive follow-up of individuals captured in the global surveillance system.
<b>Severity</b>	Identify groups at high risk of severe infection	Determining the spectrum of clinical manifestations of infections is perhaps the most urgent research priority, as it will determine the strength of public health response required.	Case control studies; cohort studies.
	Determine the role of different age groups in transmission	Important to understand whether there is a different attack rate/ susceptibility between different demographics? E.g. children/ elderly? And other risk factors.	Case control studies; cohort studies.
<b>Susceptibility</b>	Determine if children are infected, and if so, are they infectious?	Children currently do not seem to be implicated in transmission of COVID-19 - need to understand if they are potentially infected but asymptomatic and potentially infectious. There are social implications as if they are not, should schools remain closed? Do children shed? Are they infective?	Transmission studies in households and other closed settings; serologic studies.
<b>Control and mitigation measures</b>	Predict the most effective measures to reduce the peak burden on healthcare providers and other societal functions	Effective community mitigation measures can reduce transmission and reduce growth rate of epidemic and total no. of infected persons.	Comparative analyses of transmissibility in different locations.
	Estimate the effects of social distancing measures and other non-pharmaceutical interventions on transmissibility	To determine whether the measures are effective and whether they can actually reduce the effective reproductive number - if so, measures can be implemented in other settings/countries.	Comparative analyses of transmissibility in different locations - potentially study those returning to work in different cities at different times, or those schools which closed at different times.



## Report 25: Response to COVID-19 in South Korea and implications for lifting stringent interventions

There are several limitations to this analysis. South Korea's response was characterized by multiple measures including rapid large-scale testing, and social distancing measures, and we did not find enough evidence to attribute the success in controlling the COVID-19 outbreak to one particular aspect of their response. When estimating time-varying R, we assumed constant reporting, which does not hold for the South Korea dataset. A dynamic transmission model could help disentangle the relative

Time-varying R 추정치가 지속적으로 보고되리라 기대하는데, 한국에서는 그러하지 않다!

Health and Welfare and Ministry of Education), we were able to identify important data gaps. The national-level dataset we collated did not contain information on how many contacts each individual case had (and the proportion who tested positive), though data on the total number of contacts per confirmed case were available for some municipalities [33,34]. Furthermore, we could not estimate a

delay from confirmation of test result to isolation of cases or their contacts from our dataset, as only the number of contacts per confirmed case were available for some municipalities. 한국 정부기관 자료와 연구논문에 대한 체계적, 비체계적으로 평가해보면, 중요한 자료의 부족(data gaps) 있음을 확인하였다.

# 1차 (대구/신천지) 위기상황에 대한 복기

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- 공중보건위기 상황에 대한 대비(public health preparedness)를 하고 있었는가? → 방역당국
  - 병상자원, 인적, 물적 자원 동원
  - 기본 역량
- 중앙정부/지방정부/방역당국 협력적 거버넌스가 작동하였는가? → 정부조직
  - 역할, 기능, 현장에서의 조정
- 방역당국과 민간학술단체간 협력적 거버넌스는 작동하였는가?
  - 자문 기능의 실효성

# COVID-19 위기에서 드러난 과제

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## ◆ 공공-필수의료 강화

- : 지금 지방의료원의 현실은 ?
- : 공중보건위기대응도 민간에 기대어야 하나 ??

## ◆ 공중보건인프라 강화

- : 역학조사관 인원 확충만 ? 감염병지원단도 민간인 !
- : **보건**의료시스템의 원활한 작동 위한 paradigm shift !!
  - 질병관리본부 청 개편의 방향, 공중보건 가치와 내용 구현 !!
- : 근거기반 (감염)정책 수행을 위한 조직 인프라 필요
  - **질본청 산하에 정책, 사업, 교육, 연구를 통합하는 '공중보건원(Public Health Institute)' 신설**

## ◆ 지역중심 보건의료체계 강화

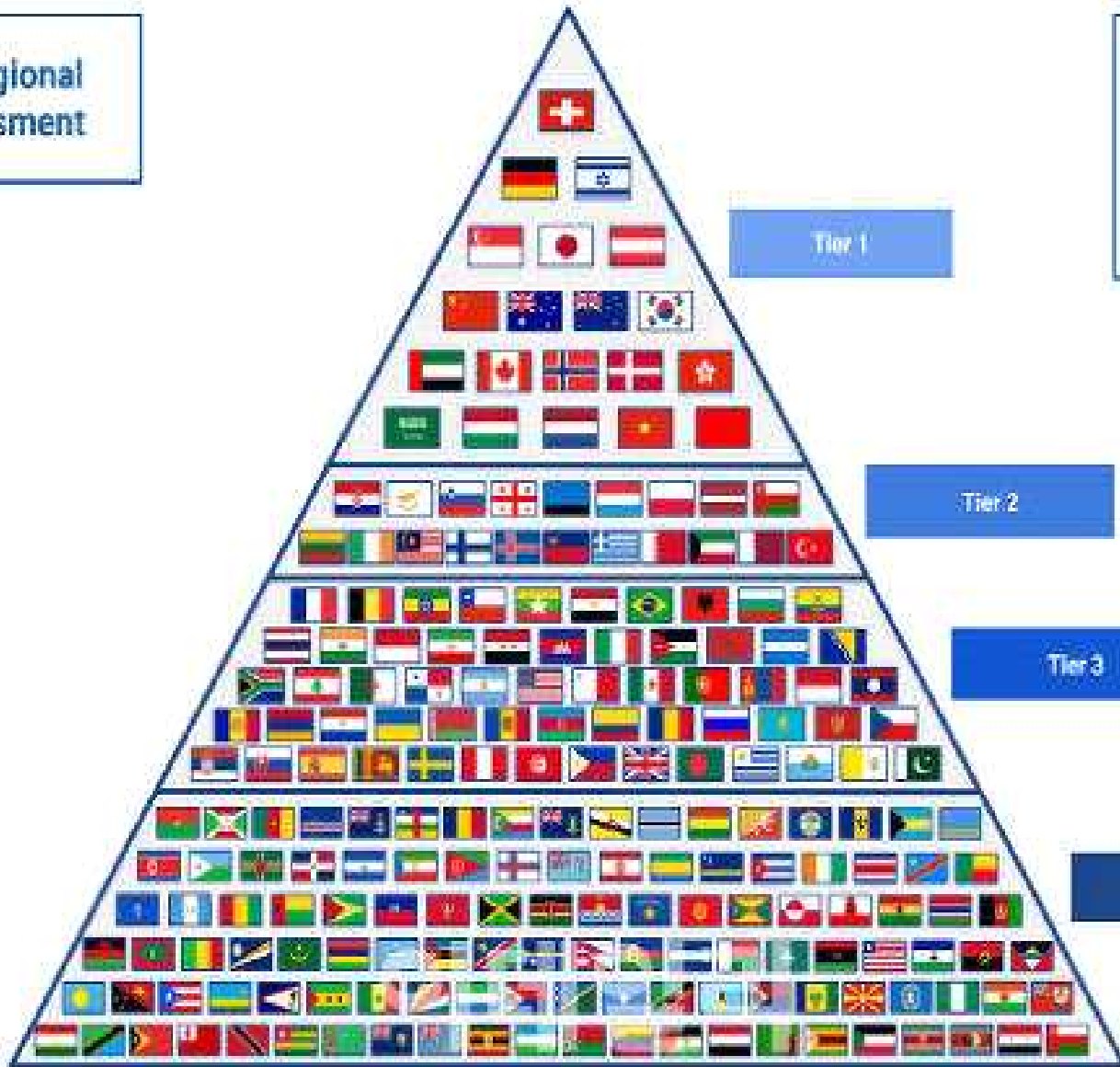
- : 중앙과 지방은 수직적 위-아래가 아님 !
- : 지역중심 보건의료체계의 재편
  - 지역거점 방역조직 건설, 중앙-지방의 협력적 거버넌스 구축

Even in the event of apparent elimination, SARS-CoV-2 surveillance should be maintained since a **resurgence in contagion** could be possible as late as 2024.

(Kissler et al., *Science* 14 Apr 2020)

# COVID-19 Regional Safety Assessment

200 Countries and Regions:  
Tier 1 - 20 Entities  
Tier 2 - 20 Entities  
Tier 3 - 60 Entities  
Tier 4 - 100 Entities



# COVID-19 Regional Safety Assessment Analytical Framework



## Quarantine Efficiency

Scale of Quarantine	Quarantine Timeline
Criminal Penalties for Violating Quarantine	Economic Support for Quarantined Citizens
Economic Supply Chain Freezing	Travel Restrictions

## Government Efficiency of Risk Management

Level of Security and Defense Advancement	Rapid Emergency Mobilization
Efficiency of Government Structure	Economic Sustainability
Pandemic Readiness	Legislative Efficiency

## Monitoring and Detection

Monitoring Systems & Disaster Management	Scope of Diagnostic Methods
Testing Efficiency	AI for Diagnostics and Prognostics
Government Surveillance Technology for Monitoring	Reliability and Transparency of Data

## Healthcare Readiness

COVID-19 Equipment Availability	Mobilization of New Healthcare Resources
Quantity and Quality of Medical Staff	Level of Healthcare Progressiveness
Level of Technological Advancement	Epidemiology System Level of Development

## Regional Resiliency

Infection Spread Risk	Culture Specifics and Societal Discipline
Level of Modern Sanitization Methods	Demography
Chronic Diseases	Geopolitical Vulnerability

## Emergency Preparedness

Societal Emergency Resilience	Emergency Military Mobilization Experience
Surveillance Capabilities	Previous National Emergency Experience

# 코로나 팬데믹:

-왜 위기인가 ?

→ Perfect crisis with huge impact

-위기의 성격은 ?

→ Widening social inequity in its impact

**-어떻게 이겨낼 수 있나 ?**

**→ Solidarity**



*"In this time of crisis, we face **two particularly important choices**. The first is between **totalitarian surveillance and citizen empowerment**. The second is between **nationalist isolation and global solidarity**."*

*"I think the biggest danger is not the virus itself. Humanity has all the scientific knowledge and technological tools to overcome the virus. The really big problem is our own inner demons, our own hatred, greed and ignorance. I'm afraid that people are reacting to this crisis not with **global solidarity**, but with **hatred, blaming other countries, blaming ethnic and religious minorities**."*



Life & Arts

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## **Yuval Noah Harari: the world after coronavirus | Free to read**



**It ain't over until it is over !!**

**Now is the golden time  
for public health crisis preparedness !!!**

**([dhkims@hallym.ac.kr](mailto:dhkims@hallym.ac.kr))**